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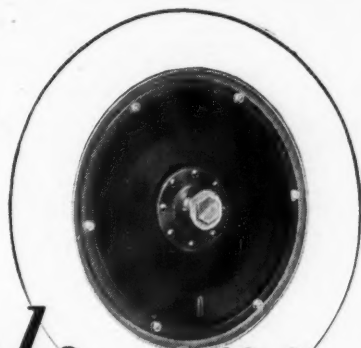
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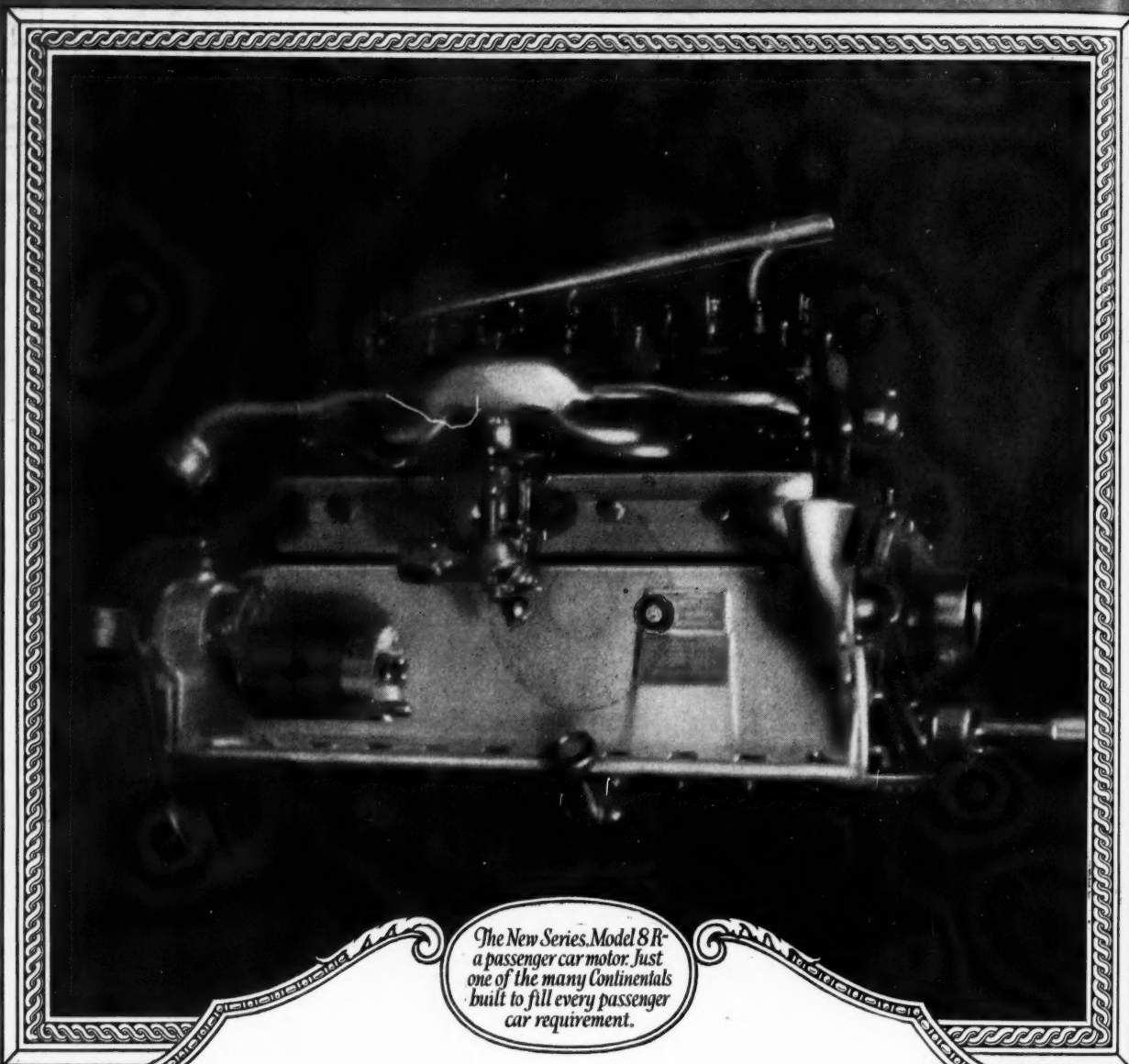


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No. 23

Factories Must Show Dealers How to Get Profits from Service

Service managers should be given responsibility and authority equal to other department heads.
Flat rate is proving successful.

By Herbert Chase

A LARGE majority of factories are seeking to better service conditions and facilities, but there is still much to be done in the way of improved relations between the factory and the service station. A few factory organizations still maintain the old fashioned attitude of superiority, if not of arrogance, when it comes to dealing with service men in the field. Most of those who have not seen the light in this respect are beginning to do so.

It is manifestly impossible to continue successfully and indefinitely relations of this kind in which each party lacks confidence in the other.

One of the primary reasons for poor service in the past is the fact that it hasn't paid its own way. It is human nature for the dealer, who is usually and properly required to render service, to slight that part of his job which brings him no direct return.

Too many dealers have acquired the notion that service cannot be made to pay—that it is one of those painful necessities which must have some attention. This is an idea which must be dispelled. It is the job of the factory to sell the dealer the fact that service cannot only be made to pay its own way, but to pay a profit almost if not quite as great as other departments of his business. In many cases the factory must educate the dealer in the methods to be followed to make service profitable, but there are also many cases in which the factory has much to learn from the dealer.

Some dealers, organized to do the job properly, are today making just as much out of their service departments as they do out of sales of cars, and, of course, sales are helped greatly by the fact that cus-

tomers know they will get good service at reasonable rates. The two go together obviously and necessarily. Without service, sales soon die. With good service, sales grow almost automatically. It is simply the old story that the dealer who takes care of his customers keeps them and gets more.

Service is naturally divided into two parts:

1. That which is given without charge to remedy defects in parts or to make adjustments covered by the manufacturers' guarantee.
2. That which is, perhaps, more correctly termed maintenance required because of normal wear.

Free service costs should be charged, not to the maintenance, but to the sales department. It is futile to argue that this is simply putting money in one pocket and taking it out of the other. Maintenance departments must be made to pay and it is unfair to charge them with the cost of free service which is clearly chargeable to the sales department.

OF course, the factory should arrange to absorb the cost of free service in some way. If the dealer is expected to "give" it, his discount should be adjusted accordingly.

Assuming that the factory is really well sold on the idea that good service is essential to a successful automobile business, what is it to do about improving service conditions?

First of all it must meet dealer service organizations more than half way when called upon for

assistance. To do so it must have a man of ability at the head of its service department and must give him sufficient authority to get the results which it is desired to attain. It is idle to expect a clerk whose chief duty is to keep records of spare parts, stock and shipments to represent the factory adequately in the capacity of "service manager."

Factory Service Man Must Have Authority

A competent factory service manager should have an intimate knowledge of the service business, an appreciation of the point of view and the problems faced by service men in the field and a good conception of the important effect which service plays in a successful automobile business. He then should be given authority on a par with that of the heads of the sales, engineering and production departments and have an equal voice with them in framing policies which affect the service he is expected to control.

If he is a mere adjunct of the sales department and is dominated by it, or by any other department, for that matter, service considerations are apt, if not certain, to take a back seat. Once given a proper position and a reasonable time to formulate and carry out a policy, he will produce results, providing, of course, he is suited for an executive job of this character. Without authority and a reasonably free hand to produce results, service will be indifferent in most cases.

It would seem obvious that a good factory service manager should be given a salary commensurate with the job he is expected to perform but, as matters now stand, he seldom is paid well and there is small incentive to attract first class men.

Sell Idea That Service Pays

One of the most important jobs which a factory service manager should do is to sell the dealer the idea that service readily can be made to return him a good profit and then help him, if he needs help, to establish service on a paying basis. This should not be done by attempting to force some set service system upon the dealer, but by furnishing him with details of various service systems which have proved successful under various conditions some one of which will come close to matching his own.

Educating the dealer is sometimes a tedious and painful process, but the retailer is quite likely to become an apt pupil if he can be shown how to increase his profits.

Many car dealers are operating today what *Motor Age* has termed a "transportation store" in which the sale of cars is an important but apparently a secondary consideration. In such cases the dealer does everything he can to keep in close touch with his customer. Having sold him a car, he makes it his business to see that he gets the most out of it that can be expected.

What Some Live Dealers Do

He aims to sell the owner all extra equipment and all necessary supplies, even to oil and gasoline, washing, storage, lubricating and all other forms of service. Every sale is made at a reasonable profit which in the aggregate often amounts to much more than the profit on the original sale of the car. In short, he sells transportation and not simply an article.

When a customer comes in for free service to which he is justly entitled, it is given cheerfully, but before he leaves he probably has bought a tire or some other piece of equipment which supplies the profit to pay for the free service. When a customer's car is in need of repairs or painting or some other form of maintenance, the "transportation store" dealer knows it and has his salesmen on the job to sell this work—at a profit. When at length the owner needs a new car there is no question what one he will buy. He knows who has taken care of his needs and

he doesn't take a chance on someone else with another make of car to sell.

Service in the transportation store is not confined to cars sold originally from it. Owners of other makes of cars naturally learn where efficient and reasonable service is to be had, and they are given the same courteous treatment, though they are sometimes told "we have all we can do today on the make of car which we sell, but if you will come back tomorrow we will do our best to work you in with our regular customers." If this be done honestly and with reasonable tact the occasional customer soon becomes a regular one and the next car he gets is the one the "regulars" drive. Such is the effect of really good service.

Needless to say, such a dealer is highly successful. He has transportation, a commodity, to sell, and he sells it in all its branches. His customers are an asset because they continue to buy from him and they boost his service, because it is a good and reasonable service and commands their respect.

This Kind of Dealer Dies

Contrast this with a situation in which the dealer makes a sale, pockets his profit and forthwith forgets his customer. He sells parts when owners demand them and grudgingly makes a minor adjustment when the owner insists that it comes within the guarantee. He lets the other fellow sell him supplies and underbid him on maintenance. When the time comes for the owner to need a new car the chances are ten to one that this dealer loses the sale because some competitor who has a reputation for giving good and economical service has fallen heir to the very customers who should be the first dealer's best prospects.

Nearly all of the service managers with whom we have talked recently say that factory engineers and executives are now giving close attention to legitimate complaints on the part of service men. They are heeding or in many cases even soliciting their suggestions for improvements in design as well as in other matters which have a direct bearing upon service. Those few who said the contrary is the case—and some of them are exceptionally competent service men—have not the most kindly feeling toward the factory and it is evident that the factory is not benefiting as it should from their experience.

Poor Labor Conditions in Service Work

A fault which, it would seem, must occur at once to all factory men is the great disparity which almost invariably exists in the service station as compared to the factory in respect to labor conditions and the methods employed for getting the most out of the men. Some repair shops, it is true, have gone out of their way to make physical working conditions as congenial as possible, but this is far from true in many cases.

No self-respecting mechanic could bring himself to work, except as a last resort, in some of the shops we have seen. The class of labor attracted and the morale of the organization is low in consequence, and there is small reason to doubt that the work turned out is on a parity with these conditions, though the hourly price charged is the same as in most other shops.

How any factory, let alone the dealer, can offer "service" of this character and expect to keep satisfied customers is difficult to comprehend. The simple fact appears to be that most of the companies who permit this sort of thing to continue are among those whose hold in the industry is slipping. Whether this is because of poor service or whether the poor service followed as a result of inefficiency in other respects is a matter for conjecture. It is certain, however, that those who give poor service cannot hope to compete much longer with those whose service is constantly improving.

Some Things Factories Can Do to Improve Service Conditions

- 1—Put service manager on a parity with heads of other departments and give him authority and pay commensurate with results desired.
- 2—Sell dealers on idea that service can be made to pay as much profit as car sales and show them how to do it.
- 3—Work out a logical flat-rate system and show the dealer it will earn money for him if intelligently applied.
- 4—See that new designs complicate service as little as possible by consulting service men before changes are made.
- 5—Seek and engender cooperation with service organizations in the field by meeting them more than half way when they need help.
- 6—Help reduce service costs by furnishing labor-saving equipment to service stations at net cost and parts at low prices.
- 7—Encourage field service men to come to your factory to make, as well as receive, suggestions concerning improvements in service.
- 8—Show dealers that it pays to offer incentives in form of piecework or bonus to their service men to do good and rapid work.

In the factory, nearly everything hinges upon getting maximum output from the employee and no pains are spared to furnish the necessary incentive in the way of remuneration in proportion to the product turned out or to provide the latest improvement in the way of tools for doing the work in hand as accurately and as expeditiously as conditions permit.

Incentive for Good Work Needed

With comparatively few commendable and quite recent exceptions, there is almost nothing to correspond to this in the service station. Until recently the equivalent of piecework or the bonus system was practically unheard of in the service station and the fear of being laid off during slack seasons was too often the only thing that kept workmen up to snuff.

There was and still is too little in the way of a positive incentive to do good and rapid work. Too frequently the good workman receives the same flat hourly pay as slower and less expert men and soon loses interest in excelling them. This makes for inefficiency and an unnecessary increase in the cost of service for which the owner pays.

An easy reply to this criticism is to say that factory piece work and bonus systems are not applicable to the service station. This is not entirely in accordance with the facts, although it is true that no factory system can be duplicated exactly in repair work.

It is possible, however, to adopt what amounts to a piecework system in a great many shops and to supply in every case a positive incentive to do good as well as rapid work. This, in effect, amounts to a bonus which not only encourages the workman but saves money for his employer as well as for the customer upon whose good will the success of any shop depends in the long run.

Surest Means to Better Service

There seems to be little doubt that the establishment of some system which puts a premium upon rapid and satisfactory work, together with the installation of labor saving devices which help to lower the cost of making repairs and doing them in better fashion, constitute the surest and most important means for bettering service conditions in general.

This brings us naturally to discussion of the flat rate. In spite of numerous difficulties encountered and some practical as well as theoretical disadvantages, there is no denying that the flat rate has been successful almost in-

variably. One New York service manager says that the system has cut customers' complaints no less than 90 per cent.

Of course there are flat rates and flat rates, as well as differing opinions as to their fairness to the customer, yet there is ample evidence that they have helped greatly toward a better understanding between the customer and the service station.

Some customers even have said that they do not mind greatly if the cost on a flat rate basis was slightly higher so long as they knew in advance what the charge would be.

One important advantage of the flat rate from the customer's standpoint is the fact that it serves as an incentive to make the shop cut its costs in doing specific jobs. This causes the wise service manager to investigate and install labor saving devices and so to plan his work as to facilitate its progress through his shop, whereas on a straight time and material basis it is to his advantage to use as much time as possible, providing, of course, he is not inclined to consider the best interests of the customer and doesn't care whether they repeat or not.

Flat Rate Not Unfair to Customer

Some service men still contend that the flat rate puts a premium on abuse and neglect of the vehicle and that the man who cares for his car must pay as much as the unconscientious user, even though the same job on the flat rate list for the former requires much less time. There is truth in this, at least in some cases, but it is true also that the owner who gives his car reasonable care has less occasion to require service and may even get a larger bill than he has a right to expect, in spite of his care, through the chance of drawing a slower workman where the shop is on a time and material basis.

On the whole the flat rate is growing in popularity and those shops which are not using it today, for the most part, are contemplating its installation in one form or another in the near future. Generally speaking, there is a feeling that the flat rate, with few exceptions, cannot be applied successfully to the repair of parts which are not easily inspected unless the user gives permission to dismantle for examination, after which a fair price can be made. Nevertheless, some concerns are applying the flat rate with at least apparent success without dismantling for inspection purposes.

Some service men believe that flat rates should include new parts as well as labor charges, for the reason that

the owner is interested in total cost rather than in the cost of labor only even though this is usually the largest item. There is logic in this contention, although there are numerous service operations in which the cost of new parts and material is of comparatively minor importance.

While most students of service problems are pretty well sold on the flat rate price to owners, much less agreement exists regarding paying the workman a flat rate for a given job. The problem has a great many angles and must be considered in the light of conditions which vary greatly in every shop.

Piecework Systems Are Successful

Abundant evidence shows, however, that piecework systems in repair shops are not only practicable but highly successful; that it pleases the customer; is liked greatly by the men; that they can be made to pay a fair profit to the proprietor. These three elements must go hand in hand in any shop which expects to continue long in the service business.

Here is an example which, we are told, is quite typical in one shop which uses what amounts to a piecework system as well as the flat rate to the customer.

Careful study of time cards covering a period of about a year during which the shop was run on a straight time and material basis showed that a certain service operation, which was one of those most frequently done, required on an average of fifteen to seventeen hours of labor. In a few instances, however, the job had been done in twelve hours.

The shop superintendent, after studying the record and the conditions to be met, reached the conclusion that if this job could be done occasionally in twelve hours with no particular incentive for rapid work, it could be done easily in this time if a definite incentive were furnished. He consequently set twelve hours as the standard time for the job and made his flat rate to the customer on this basis.

At the same time, however, he told his men that he would pay them the usual hourly rate for doing the job, regardless of how long it took, but that if they did it in less than the standard time he would pay them, in addition to the hourly rate, the same rate for half of the time which they saved; that is, for half of the difference between the time they took and the standard time he had set.

As a result, the job which formerly took an average of about sixteen hours now takes an average of only ten hours. The mechanic receives pay for eleven hours' work, the customer pays for twelve hours, and his bill for labor is a full 25 per cent less than formerly! Supposing that the men receive 80 cents an hour and that the shop receives \$1.50 an hour, the matter figures out this way:

Cost to customer \$18 instead of \$24
Cost to shop \$8.80 instead of \$12.80
Per cent gross profit 104½ instead of 87½

Flat Rate and Piecework Benefit All

Of course, the shop has a smaller gross profit in dollars than before and the mechanic receives less pay for doing the job, but the per cent profit is greater in both cases and the mechanic earns fully 10 per cent more gross than formerly. In short, everybody concerned benefits. The mechanic has a genuine incentive to make more by doing the job more quickly and the shop a corresponding incentive to do all it can to expedite the work through good organization and adequate tool equipment.

Naturally the customer is pleased, for he is getting real service which, after all, is the secret of any successful business.

Service is a commodity and those who expect to dispose of it profitably must expect to sell it, not simply to leave it for the customer to come and get if he wants it badly enough.

Many repair shops today are employing salesmen whose sole duty is to sell maintenance service. Such sales are not left to chance or to the call of the customer at the service station. Careful records of the addresses of car owners are made and each service salesman is given a group of these customers or prospective purchasers to follow up. These salesmen are the point of contact between the service station and the customer and make it their business to see, not only that service is sold, but that it is delivered on time and otherwise in accordance with reasonable demands of the customer.

It is the duty of such salesmen to meet the customer when he comes to the service station and to sell him whatever service work his car may need plus necessary supplies and equipment. When required, an inspection by a competent mechanic precedes or accompanies the sale, but in general the sale is not left to a mechanic except when the mechanic happens to be a qualified salesman. In a modern or well organized service station is the customer met by a greasy mechanic or in a dirty and disordered shop. Suitable waiting and reception rooms are provided. The customer is made to feel that he is welcome and that he will be given efficient service at a reasonable price.

Scrupulous care is exercised to see that he understands what is needed and why, what the cost will be and how soon he may expect to have his car. Most shops demand cash payment upon delivery and the customer is politely informed of this fact or, when credit is given, is required to show that his credit is good. Pains are then taken to see that all promises made are lived up to, with the result that the customer is satisfied and likely to come again.

All of this is, of course, just straightforward and perfectly logical business, but it is not commonly carried out as it should be, though some service stations are following this procedure with marked success. The factory must sell all dealers on the need for following such procedure, and then must show them how to put it into effect.

In so doing the factory must show the dealer, of course, that it will pay him to organize service along the lines indicated. Service can and must pay its own way. When the factory can sell this fact to the dealer and is ready to back it up by showing him how it is done, there will be a vast improvement in service conditions.

Bureau of Standards to Test High Speed Steels

TWO series of tests on high speed steels have been completed by the Bureau and a third series has been outlined. The tentative program for this work includes performance comparisons of commercial high speed steels in cutting carbon, nickel, chrome-nickel, chrome-vanadium, and chrome-molybdenum steels heat treated in various ways. The lathe tools are now being prepared, and several manufacturers of structural steel have promised to supply sufficient material for the required test logs.

A set of high speed steels of special composition is also being prepared in the high frequency induction furnace, as it is planned to test steels having quite different chemical composition from present commercial types, to determine the effects of added elements to the usual chrome-tungsten-vanadium steels.

In order to supplement tests already carried out on "flaky" high speed steels, thermal analyses were made of twelve samples intentionally flaked by repeated quenching. No marked differences in the thermal arrests were observed except in one case. Samples quenched three times from either 1260 deg. C or 1350 deg. C showed no evidence of the A_c transformation on reheating, whereas steel which was first quenched from either of these temperatures once, twice, or five times clearly showed this transformation at about 423 deg. C.

Small Bore, Long Stroke Engine Feature of New Rollin

Four-wheel brakes and balloon tires are standard equipment.

Four-bearing crankshaft used. Pistons and connecting rods are made of an aluminum alloy. Chassis has 112 in. wheelbase.

Four body types included in line. Phaeton weighs 2300 lb.

FOUR-WHEEL brakes, balloon tires and a number of original mechanical details are combined in the new Rollin car, a low price product developed by the Rollin Motors Co. This organization, which has taken over the plant of the Cleveland Tractor Co., is headed by Rollin White. The novel mechanical features include a small bore, long stroke, high speed four-cylinder $3\frac{1}{4} \times 4\frac{1}{2}$ -in. engine with four main bearings. Three body types are featured, as follows:

Touring car de luxe, five-passenger.....	\$975
Coupé roadster, three-passenger.....	\$1175
Sedan, five-passenger	\$1275

All of these are equipped with balloon tires, disk wheels and four-wheel brakes. The above line is supplemented by a standard five-passenger touring car priced at \$895 which is equipped with ordinary 4-in. cord tires but also has the four-wheel brakes. The wheelbase is 112 in.

Both the connecting rods and the pistons are made of aluminum alloy, and the combination of a rigid support for the crankshaft in four main bearings with very light reciprocating parts minimizes vibration. The crankshaft is drop forged from No. 1045 steel and has bearings of the following dimensions:

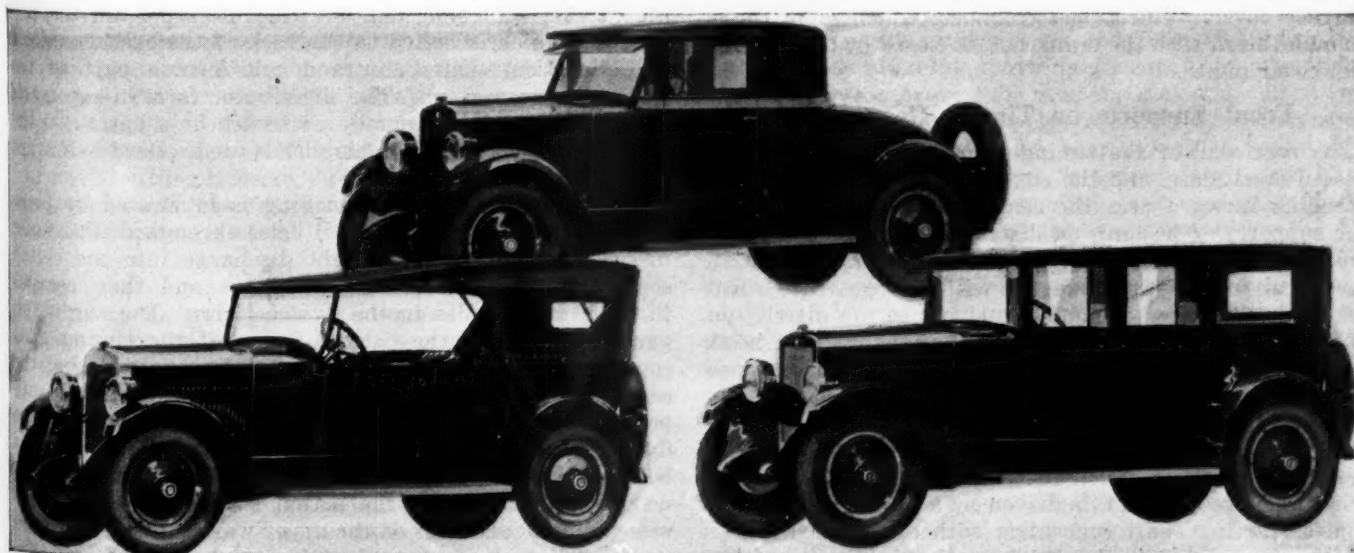
	Diame- Length,			Diame- Length,	
	ter, In.	In.		ter, In.	In.
Front	1 $\frac{1}{8}$	2 $\frac{1}{4}$	Rear	2 $\frac{1}{8}$	2 $\frac{1}{2}$
Second	1 $\frac{1}{8}$	1 $\frac{1}{8}$	Connecting rod.	1 $\frac{1}{8}$	1 $\frac{1}{8}$
Third	2	1 $\frac{1}{8}$			

The cheeks are $2\frac{3}{8} \times \frac{3}{4}$ in. Babbitt-lined, bronze-backed shells are used for the main bearings, while the babbitt is cast directly into the lower end of the aluminum alloy rods. No shims are used, and the main bearing shells are doweled in both the upper and lower halves. Bolts of 7/16 in. diameter are used for all bearing caps, four for each front and rear main bearing and two for the others. Diagonal oil holes are drilled from the inside main bearings to all four crankpin bearings.

Construction Details

Connecting rods are of I-section and 9 in. long between centers. The 55/64 in. diameter tubular piston pin is clamped in the head of the rod and bears directly on the aluminum of the piston. Four $\frac{1}{8}$ -in. rings are located above the pin bearing of the constant clearance type piston. When in its highest position, the top of the piston is practically flush with the top of the cylinder. Cylinders and crankcase are cast in a block which extends $2\frac{3}{4}$ in. below the crankshaft axis, thus forming a deep, rigid structure. High compression is used and most of the compressed charge is massed over the valves, to induce turbulence. A long skirt S. A. E. standard spark plug is inclined at a small angle so that its points are near the center of the combustion chamber.

Cast iron headed valves of $1\frac{3}{8}$ in. clear diameter are seated in the top surface of the cylinder casting. The joint is sealed by a copper asbestos gasket, and fourteen



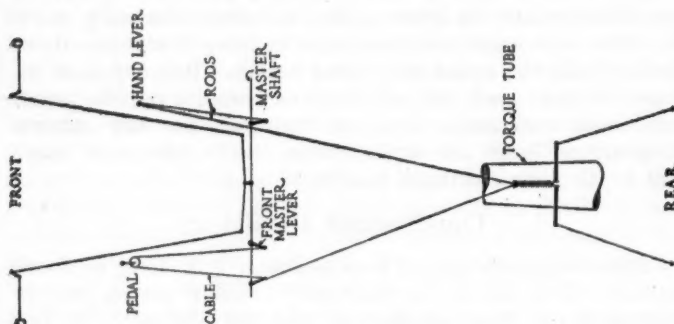
Three body models are featured in new Rollin line. Top—Three-passenger coupé roadster. Left—Five-passenger touring car de luxe. Right—Five-passenger sedan

9/16-in. studs are used to retain the cylinder head. Thermosiphon cooling is facilitated by the liberal water jacket. Valve stems of 5/16 in. diameter are piloted in cast iron pressed-in guides of 3 in. effective length. The upper end of the exhaust valve guide bushings is counter-bored slightly, to protect the stem and prevent accumulation of carbon, which sometimes interferes with the proper seating of the valves. Valve springs are 2 7/16 in. long when the valves are closed.

Mushroom tappets are grouped in clusters of four, each bracket being drawn into an L-shaped milled support by two heavy, nearly horizontal bolts. The shank diameter of the tappets is 5/8 in. and the foot diameter 1 5/16 in. The usual set screw and lock nut clearance adjustment is provided. The effective valve lift is 5/16 in. and the timing is as follows:

Intake opening, 2 deg. late Intake closing, 38 deg. late
Exhaust opening, 45 deg. early Exhaust closing, 3 deg. late

An unusually large helix angle of 45 deg. is used for the timing gear train. The cast iron gears of this train are



Four-wheel brake connections

1 1/8 in. wide and have a 10-12 pitch. Like the crankshaft, the camshaft is also carried in four bearings, which are reamed directly in the crankcase and have the following dimensions:

	Diameter, In.	Length, In.
Front	2 1/8	1 3/8
Second	2 1/16	13/16
Third	2	13/16
Rear	1 15/16	7/8

End thrust of the camshaft is taken on a bronze collar back of the camshaft gear, and location is maintained by an adjustable, hardened button which is threaded into the gearcase cover. The tappet chamber, which is in direct communication with the crankcase, is closed by two pressed steel cover plates.

Front Supports on Timing Gear Case

The rear wall of the timing gear case is formed by a pressed steel plate, and the cast iron cover has two arms extending forward near the center to form the front engine supports. The ignition distributor is driven through a pair of helical gears at the front end of the camshaft. A vertical column cast integral with the gearcase cover surrounds the barrel mounting and places the distributor head approximately on the same level as the cylinder head. This column is equipped with bosses which form part of a saddle for the Owen-Dyneto generator. Drive belt tension is adjusted by means of a turnbuckle which supports the opposite end of the saddle from the gearcase cover. The generator shaft, which also carries the two-piece, four-blade, 15-in. cooling fan, is driven by a 5/8-in. circular belt from a starting shaft concentric with the crankshaft.

This short shaft is driven from the front end of the crankshaft by a tongue and groove joint which is inclosed and centered by the nut retaining the crankshaft pinion.

The short shaft is carried in a No. 205 ball bearing, which is centered in a barrel-shaped cap centered in and bolted to the timing gear cover. The breather and oil filter is formed by a short piece of tube screwed into the timing gear cover and is provided with a snap cap. The arms cast on the gearcase cover rest upon the frame front cross member, which also carries the radiator.

A pair of helical gears at the rear end of the camshaft drives the oil pump, located near the bottom of the pressed steel oil pan. The pump bracket, a vertical cast iron column, is bolted to a flange at the bottom of the crankcase and piloted closely just above this surface and just below the drive gears. The pump discharges into the interior of the column, which latter registers with drilled holes in the crankcase at the upper pilot bearing, and through these holes communicate with the longitudinal oil header bolted to the outside of the crankcase.

Lubrication System

Four brass caps are cast on a length of 3/4-in. steel tubing to form this header. Each cap forms the oil connection at a crankcase web. The caps are of large diameter and are bolted against counter-bored surfaces spotted in the crankcase wall. Separate drilled holes convey the oil from the cap directly to each crankshaft and camshaft bearing. A pressure relief valve communicates with the channel to the front main bearing and discharges surplus oil on to the timing gear train. A tubular screen is provided at the pump intake and a level gage of the indicating type is hinged in the right wall of the crankcase. The cylinder walls (which are honed) and the valve operating mechanism are oiled by splash.

The inlet and exhaust manifolds are cast together and bolted to the left side of the cylinder block. The exhaust manifold, of rectangular section, is flared at the center to completely surround the vertical portion of the intake passage, which latter is given a venturi effect at the heated portion. A 1-in. plain-tube Tillotson carbureter is bolted to the heated section and the manifold rises out of the exhaust jacket and connects with each pair of siamesed ports. Unusually low mixture temperatures prevail at the ports, yet the engine will accelerate without difficulty even after long periods of low throttle operation. A mileage of from 25-30 per gallon of fuel is claimed. No preheating stove is used and the fuel is fed to the carbureter from a Stewart vacuum tank.

Owen-Dyneto electrical equipment is used throughout. The starting motor is carried in an S. A. E. barrel mounting at the right side, and extends forward from the bell housing, which is bolted to the back of the cylinder block. A Connecticut distributor and coil form a part of the Owen-Dyneto system. The distributor is semi-automatic in operation and is manually controlled by a button on the instrument board. Spark plug leads are inclosed in a brass conduit.

The clutch pilot bronze bushing is lubricated by pressure from the rear bearing oil holes through drilled holes in the crankshaft. The slight discharge into the clutch serves to lubricate the clutch plates and then escapes through radial holes in the flywheel rim. The engine oil pan extends from the bottom flange of the timing gear cover nearly to the back of the bell housing, ending at the center cross member which forms the rear engine support. A dam is welded into the pan just ahead of the flywheel and any accumulation of oil in the bottom of the bell housing compartment is pumped back into the forward compartment by the action of the rim of the flywheel and angular ribs on the upper wall and the inspection cover. The entire powerplant is set at a slight angle, to give a straight line drive when the car is loaded.

A 9-in. Borg & Beck clutch of the latest type transmits

the drive from the engine. The driven disk, which is a 1/16-in. thick saw steel plate drilled for lightness, carries the frictional disks. The Muncie gearbox, which is very small in appearance, is centered and bolted to a small flange on the rear of the bell housing casting. The mounting flange is located above and back of the rear engine support and, as the gearbox is exceedingly short, the overhang for the ball joint at the front end of the propeller shaft is slight. Two ball bearings are used on the upper shafts, while the pilot bearing and the countershaft are bronze bushed. Gears are 5/8 in. wide and the reductions in the box are 2.8 and 1.75 for the low and intermediate speeds, respectively, and 2.8 for the reverse. The rear end of the gear box is closed by a speedometer drive carrier which also forms the forward half of a spherical support for the torque tube. The gear shift lever is ball mounted in a column which forms part of the gear box cover and extends up through the floor boards.

Universal Inclosed at Forward End

A novel feature is the inclosure of a Snead fabric universal joint at the forward end. A tubular propeller shaft carries the rear spider of this joint and at the rear slips into a splined sleeve which is carried by the front end of the bevel pinion shaft. This sleeve is riveted to the pinion shaft as well as the propeller shaft, to prevent endwise displacements that might overstress the fabric joint.

The torque tube is bolted to the differential carrier, which is in turn bolted to the forward face of a pressed steel banjo type Salisbury rear axle. The integral pinion shaft of the 5.1:1 spiral bevel gear combination is adjusted by a screw type cage which carries a two-row annular ball bearing located ahead of the pinion. A single row bearing is placed back of the pinion, which latter is thus straddle-mounted. Taper roller bearings backed up by screw collars are located on both sides of the two pinion differential and permit of accurate adjustment of the mesh.

The live axle shafts are splined freely in the side gears and retained at the ends of the axle housing by single-row ball bearings which bear against shoulders on the shafts and are in turn retained by bolted caps and shims. The rear opening of the axle center is closed by a pressed steel cover plate.

A single transverse spring is used at the rear end, being secured at the center in a four-bolt pressed steel saddle which locks into the inverted rear cross channel at the center. Two spring clips hook over the top of the channel and pass through the saddle plate. The spring is 2 1/4 in. wide and has ten leaves, the eye to eye length being 46 1/2 in. One-piece shackles connect the ends of the spring to large pins above them which extend from the axle end casting backward. There are no nuts on the rear end, and considerable freedom is allowed, the axle shifting to the rear as the spring deflects, due to its radial motion around the ball joint at the front end of the torque tube. The transverse spring is about 7 in. back of the rear axle.

Spring Design

The front springs are 34 in. long and have six leaves of 1 3/4 in. width. All spring leaves are square sheared and all spring eyes are fitted with pressed-in bronze bushings. The front springs have fixed centers in the spring horns at the front and are shackled under the frame at the rear end. The Salisbury front axle has a rather heavy I-section and reverse Elliott knuckles. Tuarc disk steel wheels of 21 in. base diameter are used, in conjunction with 31 x 5.25-in. balloon tires. On the standard touring model this equipment is replaced by 31 x 4-in. standard cord tires and wood wheels. Detachable rims are used with both types of wheel. The base of the balloon tires is 4 in. wide.

Four cross members tie the two parallel frame side members together. Side members are of 5/32-in. stock, are 4 7/16 in. deep at the middle and have 1 1/2-in. flanges. The frame is 29 3/4 in. wide overall and the side members are kicked up 1 3/4 in. over the rear axle, the kick-up being continued in a straight line to the rear end. A Z-section front cross member supports the McCord fin and tube radiator and the front end of the engine. All other cross members are of the inverted channel type; the second carries the rear end of the power plant; the third reinforces the frame between the rear engine support and the rear spring hanger, preventing weaving at the running boards, and the fourth forms the rear spring support, as already described. A circular demountable rim carrier, secured to the side members by heavy triangular pressed steel plates, ties the rear ends of the frame together.

Internal expanding brakes of 12 in. diameter are fitted to each wheel, all parts being interchangeable. The brake is operated by a cylindrical cam which operates on conjugate surfaces at the ends of the shoes. At the front the center line of the cam coincides with the pivot pin axis, which latter is inclined outwardly at an angle of 7 deg. and meets the ground at 5/16 in. inside the tread center. Each cam is located on the end of a short shaft which is carried under the axle. The front cams are modified to release one shoe of the outer brake when making a turn. The brake shoes are adjusted for band wear by a taper plug at the top anchor. Adjustment is made by turning up a nut on the inner side of the brake carrier. The rear wheel brakes are quite similar to the front ones.

Brake Operation

All four brakes are operated by both hand and foot, the pedal control being through a complete system of equalizers, while application by lever is not equalized between the front and rear sets. Referring to the sketch of the brake linkage, the pedal carries a pulley just above its fulcrum and a cable passing around this pulley connects with the master levers of both sets of brakes. For the front system, the master lever is mounted upon a master shaft which carries an equalizing yoke from the ends of which rods extend forward at each side of the engine to the front camshaft levers.

The master shaft assembly is located under the intermediate cross member and the levers are so proportioned and located, that when the brakes are on, a line connecting the eye centers of the levers passes through the center of the torque tube ball joint. The opposite end of the foot brake cable connects with an idler lever concentric with the master shaft assembly. A rod from this idler lever extends back to a slide carrying an equalizer yoke that is mounted on the torque tube near the rear end. Rods from the ends of this equalizer yoke connect with the camshaft operating levers. The hand lever, which is mounted on the right side of the gear box, is connected by a rod to the sliding equalizer on the torque tube and by another rod to a lever at the right end of the front master shaft. The Ditweiler worm and wheel steering gear carries a 17-in. corrugated steering wheel, except on the standard touring car, which has a plain steering wheel. Both the drag link and the tie rod are of the fixed length, tubular type, each being straight from end to end. The Zerk system of chassis lubrication is used.

Trippensee bodies are used for all models. On the open cars the bodies are finished in blue paint with black enamelled fenders, etc. The closed bodies are also finished in dark blue, with black quarters above the belt. The open cars are upholstered in leather and the closed bodies in velour. All bodies are conventional in design and seating arrangement. The five-passenger touring car weighs approximately 2300 lb.

Just Among Ourselves

Believe It or Not—

THERE'S a dealer over in Erie, Pa., who has sold cars for the same company for twenty years.

In making up 1924 production schedules it will be better to be safe than sorry.

When a big town dealer for a big company went to the factory sales manager and told him a story of financial difficulties the S. M. looked at him with a fishy eye and told him he'd better go jump in the lake.

"Gasoline Bootleggers" Help Foil State Tax Law

"GASOLINE bootleggers" are becoming common although they are not so numerous as the other breed. They open filling stations on the main highways leading from states which have no gasoline tax into those which have and do a rushing business among motorists who have to pay a levy on their fuel when they're at home. The savings of those who thus foil the law are rather substantial, especially if they live near the border. A little strip inside that part of the Indiana line which skirts Michigan is a particularly fertile field. This business may be short lived for thirty-five states now have gasoline taxes and the total yield for next year is estimated at more than \$50,000,000. In most cases these levies are merely additions to those already in force. Most of those states which have overlooked them probably will swing into line at the coming legislative sessions. It might be well for them to plug the leak by which farmers buy gas for tractors, tax free, and then use it in their cars.

New "6" Called Chrysler Will Be Brought Out Soon

THE big plant at Elizabeth, N. J., now owned by Durant Motors, was built by the Willys Corp. to be the home of the Chrysler six. Some \$10,000,000 was spent for the factory, equipment and the design of the car. When Durant bought the plant he obtained the right to use the designs but he employed only a few of the features in the Flint. The Chrysler name did not go with the plans. Now it is to be attached to a new six which will be built as a part of the Maxwell-Chalmers line. This car has been planned, designed and tested under his direction. It is understood that it will be a credit in every way to a name which is highly honored in the automotive industry. Mechanical details have not been disclosed but it will be moderately priced. Production will start soon after Chrysler begins taking a more active part in directing the affairs of the company of which he has been chairman of the board since its reorganization. He has been given much of the credit for the new Maxwell which brought that company out of its financial doldrums.

Many New Jobs Will Be Seen at New York Show

MORE new jobs probably will be shown at the New York show in January than at any previous single exposition in the history of the industry in this country. So many of them are in prospect that even rival manufacturers are having a hard time keeping track of what's coming. There will be at least a half dozen sixes to sell under \$1,000 with flocks of other new models in the six line to say nothing of

fours and eights. Those New Yorkers and their neighbors who take the trouble to journey up into the Bronx to see the show will find much to repay them for their effort. It's going to be a great show in an ideal building. It begins to look as though Sam Miles had picked the right horse again, too, and that there will be about as many paid admissions as usual.

Not All Merger Reports Will Be Founded on Fact

THE industry should not take too seriously reports which originate in Wall Street of impending mergers of automobile companies. There undoubtedly will be mergers in the next year or two but only a fraction of those talked about will actually take place. Persons familiar with conditions in the industry should be able to estimate quite accurately the element of truth in such reports. Some mergers are logical and some are not. A company which is exceedingly strong financially, with a well balanced line of cars, is not likely to enter into a combination with another carrying a heavy burden of interest bearing securities, for example, even though they may be on the same general plane in point of production. Stockholders are reluctant to consent to consolidations unless they can be shown substantial benefits which will accrue from them.

Consolidations of Small Truck Companies Probable

CONSOLIDATIONS are likely to be much more numerous in the truck than in the passenger car field. This applies both to

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

the biggest and smallest concerns although there are many more in the latter category. Frequent meetings have been held to consider mergers of relatively small assemblers but in most cases they have come to naught, chiefly because of more or less petty jealousies and suspicions. The theory back of all these proposed combinations has been that each factory would serve a closely limited territory under the direction of a central management which could effect substantial economies in purchases and sales. One trouble is that not all these small companies are located in cities large enough to lend themselves well to intensive local sales effort. It is significant, however, that many of the assemblers are circumscribing sharply the territory in which they are seeking sales.

Parts Makers May Take Big Part in Combinations

NOTWITHSTANDING the abortive nature of the attempts thus far made to effect mergers in the truck field, it is inevitable that there will be consolidation sooner or later. They may be forced by the economic necessities of parts manufacturers who must find a dependable and permanent outlet for their products. It is quite logical that a group of major parts producers should combine with a group of truck makers. The effect of such a course upon the larger truck companies doing a national business is an interesting subject for speculation. The more closely small assemblers concentrate upon local sales, with reduced costs and better service, the more difficult will it be for national competitors to do business in their territories. The trading evil will become for

them then just as serious a problem as it is today for the small concern trying to sell in all parts of the country.

Roadways Rapidly Approach Physical Saturation Point

EVERYBODY is speculating on the probable production for next year. Some think it will be larger than it was this year and some think it won't. The "won'ts" probably constitute a majority although the two largest producers alone are contemplating an output of something like 3,800,000. In this field, from the point of view of the purchaser, price has ceased to be a serious consideration. The greatest obstacle in the way of this gigantic sales program is physical saturation of streets and highways. Traffic conditions are growing worse rapidly notwithstanding all that is being done to remedy them. This is so in the smaller cities to an even greater degree than it is in the larger ones where regulation is more rigid. It is literally true that much of the time for nine months of the year driving is more difficult on the roads leading out of New York than it is on Fifth Avenue or Broadway and the same general conditions apply to all cities. Where are all the new cars to be run, therefore?

Price Changes in Year Were About Equalized

TAKING nineteen models in sixteen of the most popular lines of passenger cars, six of them showed an increase in price from Dec. 1, 1922 to Dec. 1, 1923. Eight showed decreases and five no change. The largest increase was \$100 on the most

expensive car in the list and the largest decrease was \$180. The aggregate price of one model in each line a year ago was \$22,593 while it is now \$22,425, giving an average of \$1,189.10 in December last against \$1,180.26 at present, an average saving of \$8.84. These figures mean absolutely nothing beyond showing that price changes in the last twelve months have been of relatively little consequence. The most important price shifts impending are in relation to entirely new models or new lines. The more or less standardized models are likely to show few changes—either up or down.

One Dealer Has Found Way to Cut Brake Lining Costs

ONE of the successful passenger car dealers in a large Western city has found that it pays big dividends to satisfy customers and that the best means of keeping them in good humor is to give service at the lowest rate which will return a profit. For example, the flat rate established by his factory for relining brakes is \$17.50 but he has reduced it to \$7.50 by assigning one man to the job of relining salvaged brake bands. When an owner drives in to have his brakes relined, a set of the salvaged bands which are as good as those on the car, are put on in short order and the customer drives away. This dealer pays his service superintendent \$7,500 a year. Incidentally, his salesmen are paid a salary of \$350 a month and given a bonus in addition for meritorious work. The entire city is included in this man's territory while a closely competing line has eleven dealers, but his gross business is almost equal to that done by the entire eleven.

J. D.

Modern Piston Ring Practice Involves Efficient Design and Production

Part I

Method of securing pressure in forming has changed radically in recent years. Best proportional width is open to debate, but tendency is toward narrower types. Three means are used to endow the blank with the necessary expansive qualities.

By P. M. Heldt

THE piston ring is one of those parts of the automotive engine which has been developed to a considerable extent by specialists. The first internal combustion engines were provided with rings similar to those which had been successfully used in steam engines for a great many years. The problem of sealing the joint between the piston and cylinder wall of such engines did not seem to present any particular difficulties, though somewhat higher pressures had to be sealed against than in the case of the steam engine, and higher temperatures had to be withstood.

As the development of the engine continued, it was realized, however, that the piston rings perform a very important function. If the rings do not fit well, a considerable proportion of the combustible charge may leak by the piston during the compression stroke, and of the products of combustion during the power stroke, which involves loss of energy. Besides, with poorly fitting rings an excess of oil is likely to get into the combustion chamber, causing a smoky exhaust and the deposition of carbon on the combustion chamber walls, and considerable quantities of the heavy ends of the fuel may find their way by the piston and cause rapid dilution of the lubricating oil in the crankcase. As originally made, piston rings cost very little to manufacture, and it must have dawned upon those active in the technical development of the industry that if a ring could be designed that would give a materially better seal than the ordinary ring, it would not matter if it cost twice or three times as much to manufacture.

One object aimed at in piston ring design is to secure uniform pressure of the ring at all points of contact between it and the surface of the cylinder bore. A certain minimum pressure is required, in order that carbon particles, etc., adhering to the cylinder wall may not force a section of the ring out of contact with the cylinder, thus allowing the gases to escape, and much greater pressure than this minimum value is undesirable because with increasing pressure the power loss due to the friction between the rings and the cylinder wall, and the

wear of the contact surfaces, increases to an extent.

Moreover, the mechanical properties of the ring material put a limit to the specific pressure, because, in order to obtain increased pressure, we have to increase the radial depth or thickness of the ring and with the thickness, the stress in the ring material when the ring is stripped over the piston and when it is compressed in the groove to force it into the cylinder, increases.

Perhaps the most radical change in the method of manufacturing piston rings has been in the method of securing this pressure. Formerly the rings were first turned to a diameter somewhat larger than the cylinder bore; a section of the ring was cut out to form the gap;

the ring was then compressed until its ends nearly came together, and while in this compressed state, the ring was turned or ground to the exact diameter of the cylinder bore.

It can easily be shown by theoretical reasoning and it was also proven by experience, that a ring so made will not exert a uniform pressure at all parts of its circumference. Usually the pressure is greatest at both ends and nil or practically nil at certain intermediate points. One expedient resorted to in order to even out the pressure of the ring

around its circumference consisted in turning the ring to an eccentric form, making the part directly opposite the gap about twice as thick as the ends. This is only a partial solution of the problem, for theory shows that for uniform pressure the thickness of the ring should come down to nothing at the gap, and the ring also suffers from the disadvantages that the thin ends do not provide such an effective seal as ends of full depth, and that they wear the sides of the groove rather rapidly. The total pressure between the ring and the sides of the groove depends mainly upon the width of the ring and if the thickness is made small, the unit pressure on the sides of the groove is increased and wear is accelerated. The disadvantages of the old method of making rings, therefore, were that the rings did not give anything like uniform pressure over their whole circumference and that the narrow sides of the ends of eccentric rings rapidly wore the sides of the

PISTON rings have been developed, for the most part, by specialists. Although a relatively small part in the automotive engine, their importance is very great from a performance standpoint. Problems in design, construction, and testing are constantly arising.

In this article, and in one which will follow in an early issue, P. M. Heldt reviews the development of modern piston ring practice and gives some constructive ideas about the relative efficiency of various design features.

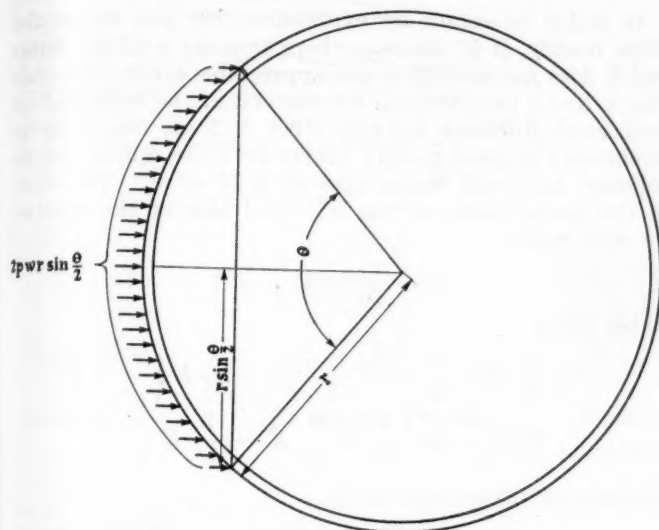


Fig. 1—Diagram of bending moment on ring section

grooves, especially in light metal alloy pistons such as those of aluminum.

There are three methods of endowing a ring blank turned or ground to the diameter of the bore, with the expansive qualities necessary to produce the desired pressure against the cylinder wall. The first consists in hammering or peening the ring on the inside, or on the sides near the inside edges. This peening process has the effect of spreading the metal where the blows fall, and the final effect is to increase the radius of that portion of the ring where the peening has been done.

If the ring were peened uniformly over its whole inner circumference the radius would be increased uniformly all around, and, as with uniform pressure of the cylinder on the ring all around, the radius is reduced much more at the center than at the ends, this would not give a ring producing a uniform pressure. To get uniform pressure the peening must be intensified from the ends toward the center of the ring, which can be done either by varying the intensity of the blows or by varying their spacing.

Peening Machines Built

A number of machines for effecting this graduated peening automatically have been produced by piston ring makers. Where this method of imparting flexibility to the ring is used, the ring is turned to the exact diameter of the cylinder bore, and in cutting the slot very little metal is removed, just enough to take care of the greater heat expansion of the rings as compared with the water-cooled cylinder when the engine heats up to its working temperature. After the rings are peened, the ends, of course, will be a considerable distance apart.

A second process for putting the ring under tension consists in rolling it. The ring, after having been turned and gapped, is put into a die or mold, and is rolled on

the inside under heavy pressure. Apparently the rolling process has a similar effect to that of peening, spreading the metal under the pressure of the roll and thus increasing the radius of the ring. Cast iron ordinarily is not regarded as a ductile metal, but it appears that it can be made to spread or flow to a limited extent if the pressure applied is sufficiently intense. The form of the die, of course, will influence the effect of the rolling.

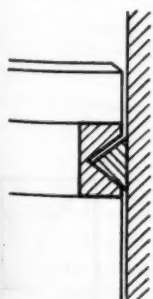
The third plan of putting rings under tension consists in expanding the ring, after it has been turned and gapped, over a taper mandrel or a mandrel of somewhat larger diameter than the inside diameter of the ring, and while in this expanded condition, subjecting it to a heat treatment. The effect of the heat treatment is to cause the molecules of the iron to set in the positions corresponding to the expanded condition of the ring, so that it requires pressure against the outside surface of the ring to bring it to its original position.

Whether one or the other of these methods of imparting tension has any advantage over the rest is difficult to say. If accurate tests of piston rings were possible, the two points on which a comparison should be made are uniformity of pressure distribution and permanence of the pressure under the conditions obtained in an internal combustion engine cylinder. It is realized, of course, that the distribution of pressure would probably depend more upon the particular application of the method than upon the method itself.

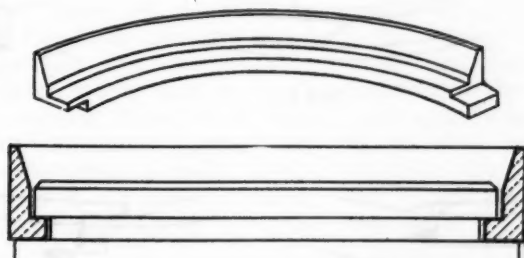
Uniform Pressure Sought

It was stated in the foregoing that by cutting a section out of a ring larger than the cylinder bore, than by compressing the ring and refinishing the outside, does not give a ring that will exert a uniform pressure over the whole of its circumference. This applies to rings which originally are circular in shape. There is, of course, a shape of ring which when subjected to a uniform pressure at all points of its circumference will assume a true circular form of the correct diameter. It is quite possible to calculate the shape of such a ring when in the expanded state, at least approximately.

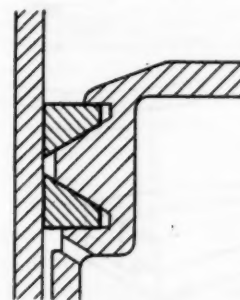
The reaction of the cylinder wall on the ring creates a bending moment in the latter. This bending moment is zero at the ends of the ring and a maximum opposite the gap, or midway between ends. The effect of the bending moment is to give the ring more curvature, that is, to reduce the radius of curvature at any point, and the reduction in the radius of curvature at any point will be a function of the bending moment at that point. Since there is no bending moment at the ends of the ring there will be no change in the radius of curvature at these points, and this radius should be made equal to the radius of the cylinder bore. As we pass around the ring from one end, the bending moment becomes greater and greater, until it reaches a maximum value at the middle of the ring, and the radius of curvature therefore also should increase from the end toward the middle. Just



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Fig. 2—Gas-expanded rings

how it should increase and what its maximum value should be relative to the cylinder bore may be determined as follows:

Let p be the pressure of the ring against the cylinder wall, in pounds per square inch of contact surface, and let r be the radius of the cylinder bore, w the width, and t the thickness of the ring, all in inches. Let us consider a section of the ring beginning at the gap and subtending an angle θ at the center of the compressed ring (Fig. 1). When the ring is in the cylinder this section will be a circular arc, and the pressure normal to the cord of this arc will be

$$P = pw2r \sin \frac{\theta}{2}$$

The average lever arm through which this pressure acts is $r \sin (\theta/2)$, and the moment of pressure at the end of the section is

$$M = 2pwr^2 \sin^2 \frac{\theta}{2}$$

The stress in the metal of the ring, at the end of the section considered, due to this moment, is

$$S = M \frac{6}{wt^2} = 12p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2}$$

The stress in the metal of the ring induced by applying a radial pressure to its outside surface can also be expressed in terms of thickness of the metal at the section considered, its primitive radius of curvature r_1 and its final radius of curvature r , the latter being identical with the radius of the cylinder bore. This expression, the derivation of which is given in the writer's book on The Gasoline Motor, page 126, is as follows:

$$S = Et \frac{r_1 - r}{2rr_1 - t(r + r_1)}$$

Equating these two expressions for the stress we get

$$12p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2} = Et \frac{r_1 - r}{2rr_1 - t(r + r_1)}$$

Simplifying

$$12p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2} = E \frac{r_1 - r}{2r_1 - t - t(r_1/r)}$$

In order to obtain an expression that can be handled more readily, it is necessary here to make a slight change which does not introduce any appreciable error. We know that r_1 and r are identical for the end of the ring, and not very much different for any other section; also, that the thickness t is equal to very nearly $1/16$ the radius r of the cylinder bore and hence also to $1/16$ of r_1 . Therefore, in the denominator of the left-hand side of the equation we will make

$$t = \frac{r_1}{16} \text{ and } \frac{r_1}{r} = 1$$

which gives

$$12p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2} = E \frac{r_1 - r}{1\frac{7}{8}r_1} = \frac{8}{15} E \left(\frac{r_1 - r}{r_1} \right)$$

$$12p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2} = \frac{8}{15} E - \frac{8}{15} E \frac{r}{r_1}$$

Multiplying through by $15/8$,

$$22.5p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2} = E - E \frac{r}{r_1}$$

Transposing

$$E \frac{r}{r_1} = E - 22.5p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2}$$

Dividing by E

$$\frac{r}{r_1} = 1 - \frac{22.5}{2} p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2}$$

Multiplying by r_1 and then dividing by its coefficient

$$r_1 = \frac{r}{1 - \frac{22.5}{2} p \frac{r^2}{t^2} \sin^2 \frac{\theta}{2}} = \frac{Et^2 r}{Et^2 - 22.5pr^2 \sin^2 \frac{\theta}{2}}$$

Upon the ratio r/t depends the stress in the metal of the ring and this ratio cannot be made much less than 15. It will be seen from an inspection of the above equation that when $\theta = 0$, that is, at the ends of ring, $r_1 = r$. In other words, the primitive radius at the end should be made equal to the radius of the cylinder bore. At any other point of the ring the primitive radius r_1 is greater than r , and it is greatest at the point opposite the gap.

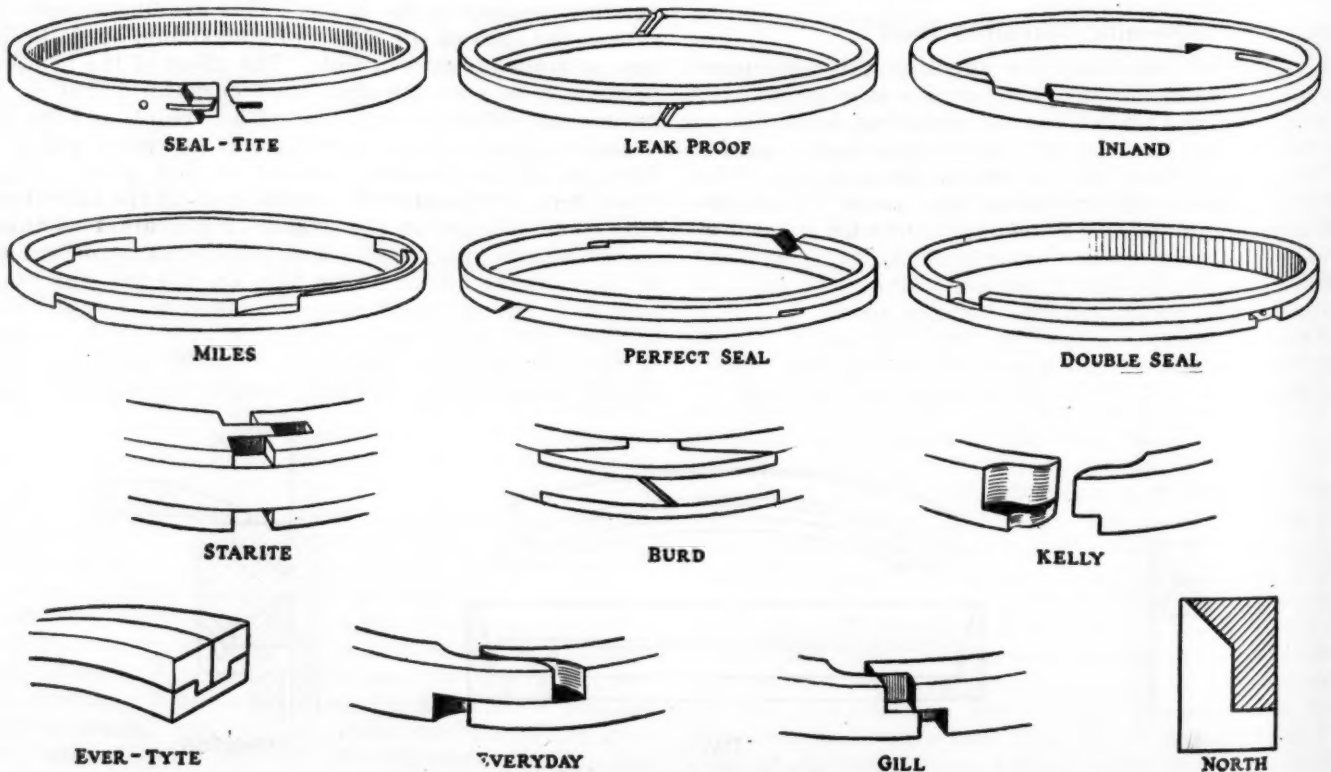
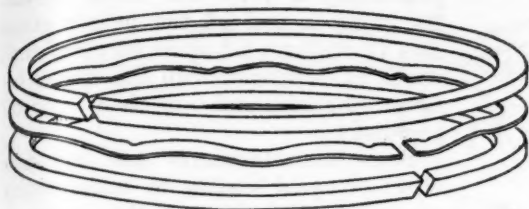


Fig. 3—Rings with provision against gap leakage

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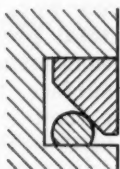
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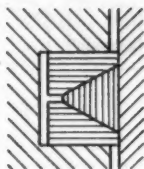
VELVET



KENDELL



PRESSURE PROOF



V-PLEX



REBO DUAL



Fig. 4—Laterally expanding rings

To see how much greater it should be we will assume the following values:

$E = 14,500,000$; $r = 2$ in.; $t = \frac{1}{8}$ in.; $p = 6$ lbs. per sq. in. Then

$$r_1 = \frac{14,500,000 \times \frac{1}{8}^3 \times 2}{(14,500,000 \times \frac{1}{8}^3) - 22.5 \times 6 \times 2^3 \times 1} = 2.079 \text{ in.}$$

The average value of the squares of the sines is exactly 0.5, and hence the average value of the primitive radius is:

$$r_a = \frac{r}{1 - \frac{11.25}{E} p \frac{r^3}{t^3}} = \frac{Et^3 r}{Et^3 - 11.25pr^3}$$

The circumference corresponding to this average radius is

$$C_1 = \frac{2\pi r_a t^3}{Et^3 - 11.25pr^3}$$

and since the actual circumferential length of the ring is $2\pi r$, the length of the gap of the expanded ring is

$$l = \frac{2\pi r_a t^3}{Et^3 - 11.25pr^3} - 2\pi r$$

which can be simplified to

$$l = \frac{22.5\pi r^4 p}{Et^3 - 11.25pr^3}$$

To this must be added the necessary clearance at the gap, $0.005r$, giving a total length of gap of

$$l = \frac{22.5\pi r^4 p}{Et^3 - 11.25pr^3} + 0.005r$$

In laying out the expanded ring pattern by means of the above equation for r_1 , it must be remembered that the arc θ refers to a section of the ring in the compressed form and that the primitive radius r_1 corresponds to a slightly smaller arc in the expanded than in the compressed ring, for the reason that when in the expanded state the ring is no longer a full circle or 360 deg. Let us say that the primitive radius of the ring opposite the gap figures out to r_m , then the average radius will be equal to $(r_m + r)/2$, and all of the arcs will be decreased in the proportion $(r_m + r)/2$ to r .

Patterns for individually cast rings can be made to this non-circular form, or else the rings can be turned to this form in the lathe with the aid of master rings or master blanks. One manufacturer states that he turns the rings to this theoretically correct form, after they have been gapped, by clamping the ends together and holding the ring in such a manner that as metal is removed it constantly adjusts itself to its natural shape, so that when completely finished the ring in the free state is a perfect circle.

The best proportional width of rings is a subject open

to debate. It seems that there has been a tendency to go to narrower rings, especially in connection with aircraft engines. There is one definite advantage in narrow rings, and that is that they cut down the power loss due to ring friction. It might also be thought that, since the specific pressure of the ring against the cylinder wall is independent of the width of the ring, a narrow ring would give as good a seal as a wide one. This is not absolutely true, however, for in case a particle of carbon gets under the ring the pressure on that particle tending to crush it will be proportional to the width of the ring. If the pressure is insufficient to crush the particle, there will be leakage past the ring, hence it is apparent that there is an advantage in comparatively wide rings. Also, one might expect the wear on the circumference to be independent of the width of the ring, but makers state that it has been their experience that narrow rings wear more rapidly on the circumference than wide ones. The wear on the sides of the ring and of the groove should certainly be less with narrow rings, as the drag on the ring, due to both friction and inertia, is proportional to its width; consequently the force of the impact when the ring shifts from one side of the groove to the other should be greater with the wide ring. A disadvantage of the narrow ring is that it is more delicate in handling. The rule for width of rings has been to make it equal to one-twentieth of the cylinder bore, which gives a width of $3/16$ in. for the average size of automobile cylinder. Some designers have gone to $1/8$ -in. rings for automobile pistons, but $3/16$ is still the most popular width for bores of between 3 and 4 in.

Eccentric Ring Discarded

It has been stated already that one reason for discarding the eccentric ring was that the thin ends tended to wear the sides of the groove abnormally. This wear of the groove is a particularly serious matter in the case of pistons cast of soft alloys, such as aluminum alloys. The wear of the groove, of course, is due to the fact that the ring presses first against one face and then against the other, and as it changes position it produces a sort of hammering action, the intensity of which, no doubt, increases rapidly with the lateral clearance. The position of the ring in the groove is dependent upon the friction between ring and cylinder wall, upon the inertia of the ring, and upon the gaseous pressure within the cylinder, the effect of the latter depending in turn upon the clearance, being greater in case of the top ring than in the cases of the others.

Quite a number of rings consisting of two or more pieces and so designed as to always fill the whole width

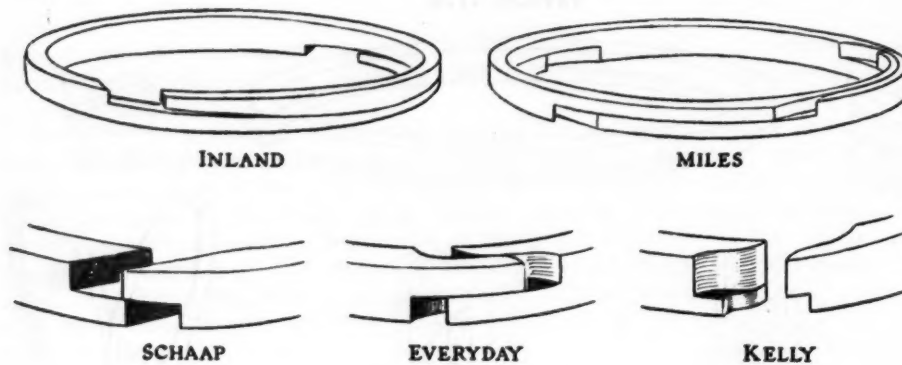


Fig. 5—Non-butting rings

of the ring groove have been placed on the market in recent years. In one of these compound rings there are two cast-iron rings at opposite sides of the groove, with a flat steel spring with radial corrugations in it between them. In order to get the compound ring into the groove, the three parts have to be pressed together endwise, and once in the groove the steel ring forces those of cast iron against the sides of the groove. In most rings of this type the contact surface between two members is inclined to the axis of the ring, and the radial pressure of one member creates both a lateral and a radial pressure in the other. One member is usually depended upon to effect the seal on the circumference and at one side of the groove, the other at the remaining side of the groove.

Reports on the efficiency of such rings are at variance with each other. It is generally conceded that they work well while new, though it is claimed by some that even then the friction of the ring against both sides of the groove exerts a certain damping action which makes it difficult for the ring to follow any inaccuracies of the bore, such as a slight tapering from end to end. They say that rings of this type have no "life." It is, of course, quite conceivable that when rings of this class, comprising two or more pieces, are covered with carbon and gummed up, they are not as efficient as when new and clean, but this applies to all rings. Perhaps the best proof of the efficiency of such rings lies in the rapid increase in the number of different designs on the market. The fact that laterally expanding rings are not as free in the groove as single piece rings is admitted by the manufacturers of such rings, but they consider this to be an advantage rather than a fault, claiming that it tends to prevent piston slap.

Perfect Fitting Difficult

In spite of the most accurate machine work on both the cylinder bore and the rings, the latter never fit the bore perfectly when first installed, and for a certain period after a new engine is put into service, or after new rings have been placed on the pistons, the power and efficiency of the engine will increase. It is, of course, desirable to reduce this "running-in" period to a minimum; that is, to so build the engine that the maximum output and the maximum efficiency are attained with the least delay.

Formerly, piston rings were generally ground on the outside surface, the surface which bears against the ground cylinder wall. It has been found, however, that if the outside surface of the ring is turned in the lathe, it seats itself to the cylinder wall very much quicker, and most manufacturers of piston rings now turn their rings, some even taking a comparatively coarse cut. The turning operation, instead of giving the smooth finish obtained by grinding, provides the surface with what is

practically a very fine screw thread. By using a tool of the proper shape this thread can be made of very small width as compared with the spaces between threads, and will then wear off rapidly.

Some manufacturers get the same effect of rapid seating by undercutting one-half or two-thirds of the surface of the ring to a depth of about 0.002 in. The total pressure of the ring being then concentrated on the reduced contact surface, this surface wears down faster than it otherwise would, or at least that is the theory. One manufacturer even provides his rings with three

concentric surfaces on the outside, each about 0.0015 in. below the one of next larger radius, and as the higher surfaces wear down the others come into effect successively.

Those who still grind their rings on the outside raise the objection to the quick-seating principle, that as the diameter is reduced by the wear of the rough exterior surface, the gap is increased in length at a rate 3.1416 times faster. With any of the ordinary forms of gap there is, of course, a chance for leakage, but the leakage area at any particular gap in the worst case is only the product of the length of the gap into the clearance between the piston and the cylinder. For instance, if the piston clearance at the ring belt is 0.012 in. and the gap is increased in length by 0.006 in. by the wear of the turned face, then the leakage area increases by 0.000072 sq. in. and not very much gas will leak through this infinitesimal area during the small fraction of a second occupied by the compression.

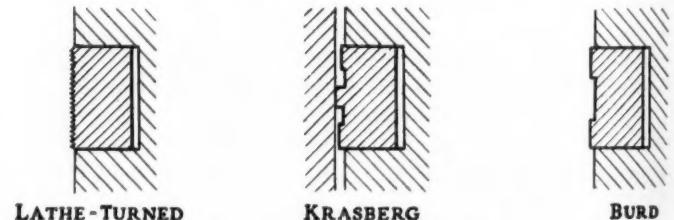


Fig. 6—Quick-seating rings

Advantages of Blended Fuels Often Overstated

Mechanical Engineering for October, 1923, contains an abstract of an address on Blended Fuels for Automotive Engines by Prof. Julian C. Smallwood of Johns Hopkins University which sets forth in conservative fashion the case in favor of and against such fuels, especially those containing benzol. Among the conclusions reached are the following:

Blended fuels do not develop appreciably greater power than gasoline when the engine is in good condition and is adapted to the fuel.

As for flexibility, or that vague quality referred to as "pep," there seems to be little preference with a normal engine designed for gasoline. The same can be said concerning ability to start cold in winter.

Blended fuel is worth perhaps two cents per gallon more than gasoline in some cases, but a greater price differential is not justified by the advantages gained.

In view of these conclusions it would appear that the case in favor of various blended fuels offered in some localities frequently is overstated greatly.

New Heat Treatment Bath Permits Handling of Parts in Finished Form

Treated lava is base. Is supplied in metal containers. Since material is neutral to steel no scale forms and production is increased materially. Special furnace equipment developed.

A NEW form of heat treatment bath in which tools or parts may be treated in the finished shape without deformation, oxidation or decarbonizing has been developed by the Bellis Heat Treating Company. The base of the molten bath is understood to be treated lava, which is supplied in metal containers in three commercial grades, known as Carbon Steel Lavite, High Speed Steel Lavite and Tempering Lavite. When heated to the proper temperatures, these materials form mobile liquids of high specific heat and of a specific gravity of only about one-sixth that of the lead bath. No hood or ventilation system is required, as no fumes are evolved.

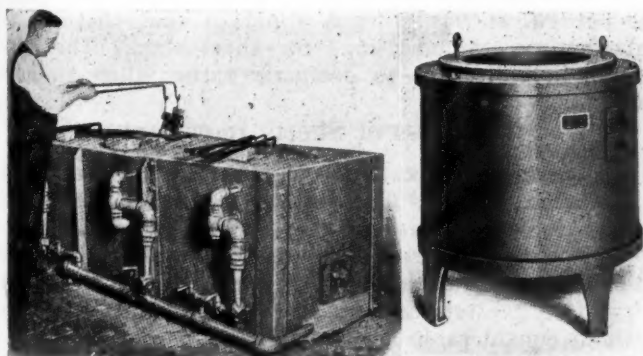
Heat treatment of parts, such as gears, piston pins, tappets, bearing races, drop forging dies and die casting dies and production treatment of edged parts like scythes, auger bits, etc., has been accomplished with unusual success by the use of Carbon Steel Lavite. This process was developed during the war for the heat treatment of small ordnance parts. As the material is neutral to steel, no scale of any kind forms and production is

the intimate contact with the Lavite bath. The pieces are then quenched in another bath of similar material at 950-1250 deg. Fahr., giving a maximum degree of hardness and eliminating the danger of cracking. As Lavite is stable and non-volatile, there are no gas pockets or deposits of carbon to interfere with the uniformity of the heat treatment.

Crucible Equipment

Special furnace and crucible equipment has been developed for use with this process. While barium chloride, cyanide and lead pot furnaces can be converted to give satisfactory results, specialized equipment is recommended to insure maximum fuel economy and least maintenance cost. Pressed metal pots are supplied as they heat more rapidly and are free from the permanent growth that is characteristic of cast iron pots. In the case of the Lavite high speed process, a triple unit furnace is recommended in which the preheating and quenching baths are heated by the exhaust from the high heat chamber, which latter is equipped with a crucible having a high heat resisting refractory exterior and an alloy lining. The single unit furnace has been designed to handle the maximum amount of work in small units. An arrangement of multiple staggered burners directs the flame tangentially on to the walls of the combustion chamber and prevents impingement on the pot and consequent local hot spots.

Great economy is claimed for this process, as comparatively unskilled labor may be utilized, pieces being heated to the temperature of the bath only. The Lavite or heating medium is not lost by vaporation and the small amount that is transferred on the pieces from the high temperature to the quenching bath segregates and can be returned. Fuel cost is low, as the parts are in intimate contact with the heating medium. The very nature of the process eliminates manufacturing losses caused by distortion, scaling and cracking.

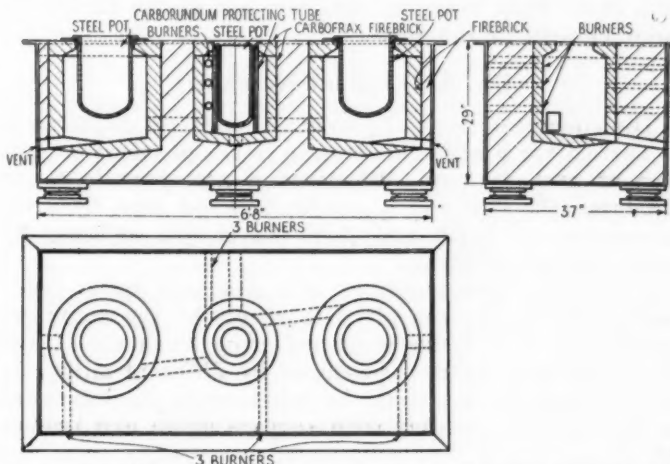


Bellis triple and single-unit Lavite furnaces

greatly increased. This property, together with the ability to form a protective coating over the parts as they are put in the bath, allows the treatment of completely finished parts. As the parts are taken from the bath, a protective coating is again formed, preventing oxidation while parts are transferred to the next bath. This protective coating, together with the turbulence of the mobile liquid due to convection currents, causes uniform heating of the part in the bath and therefore eliminates distortion. Carbon Steel Lavite has also been used for heat treating stainless steel.

Finished Tools Treated

High speed steel tools and cutters can be treated in their finished form by the Lavite process. Annealing is accomplished in a second, lower temperature bath having the same physical and chemical characteristics. In the first bath the temperatures are practically the same as with older hardening methods, but it is claimed that the pieces heat more rapidly and uniformly, because of



Plan and sectional views of Bellis triple-unit furnace

Automobile Sheet Steel Standards Are Needed Greatly

Lack of knowledge concerning product needed is cause for serious economic waste in both steel and body building plants. S.A.E. committee is now giving matter study and General Motors has formulated tentative specification as basis for discussion.

By H. M. Williams*

Metallurgist, General Motors Research Corp.

DEVELOPMENT of specifications for the inspection and test of automobile sheets is occupying the attention of many metallurgists and engineers. The demand for this class of steel has at least equaled the supply, and this situation has been a large factor in the postponement of standardization of this important automotive structural material. Very great losses in unusable stampings and in labor to repair defective ones have resulted from faulty or unsuitable material, difficult forms and improper die construction. Frequently a new die will not produce a perfect stamping for weeks after it is put into commission.

Body engineers design parts that are very difficult to develop and the die engineer is not consulted until the design has been approved. It is then a question of finding a quality of sheet that will produce the desired part in a certain die, which often makes it necessary for some sheet mill to produce a new quality of sheet. At the present time one sheet mill is producing over fifty different kinds of sheets varying in surface finish and temper. It is evident that this condition of affairs results in a great economic loss to both producers and consumers. Only the full cooperation of the sheet mills and the automobile body and parts makers can remedy this condition and standardize sheets, design and die construction.

The logical procedure as a first step in the development of specifications is to standardize on a few sheets representing the surface finishes required for the various methods of finishing; then produce these sheets in a limited number of tempers. Temper refers to the ability of the sheet to form such as is indicated by deep drawing, extra deep drawing, etc., and not to the carbon or alloy content of the sheet.

Die Adjustment Necessary

Die construction must permit of sufficient adjustment to correct for permissible leeway in the physical properties of each temper. Whenever a new part is to be produced, the steel can be readily selected, first from the standpoint of finish and then the temper selected by actual tryout of sheets.

A standard nomenclature will eliminate many trade names that have been given to sheets by the manufacturers, the same name often referring to sheets of different characteristics if produced by different mills. If such a classification could be made, everyone interested would soon be familiar with surface finish and temper

and sheets could readily be substituted from plant to plant or job to job.

The question of gage of sheets should have consideration. Instead of using gage numbers, the thickness should be specified in thousandths of an inch, with permissible tolerances within reasonable limits. The only legal gage is the United States Standard Gage for Sheet and Plate Iron and Steel established by Act of Congress in 1893. This is a weight gage, thickness being incidental. This gage is based upon the weight in avoirdupois ounces per square foot. Thicknesses as established from this gage are approximate equivalents based upon the weight for wrought iron of 480 lb. per cu. ft. Since this gage was established, wrought iron has almost entirely been superseded by steel with a weight of 489.6 lb. per cu. ft. It is thus apparent that there is no satisfactory standard gage for sheet steel. The mills prefer to roll steel to decimals rather than to gage numbers.

Thickness of Sheets Important

Thickness of sheets is very important on account of its effect in the dies. Before the stampings can be made, it is quite often necessary for the sheet metal department to separate the sheets into piles according to their thicknesses. The thickness tolerances on the sheets are very often greater than can be taken care of by the dies without considerable adjustment.

Difficulties encountered in the production and utilization of sheets are numerous and varied. One of the sheet mills has a standard form or data sheet which analyzes rejections of pickled sheets. On this form, six defects are chargeable to sheet bars, seventeen to hot rolling, four to pickling, eight to cold rolling and three to annealing, making a grand total of thirty-eight causes for rejection. Even after a sheet successfully passes this ordeal it may give trouble in the stamping operation, due to forming qualities, poor surface after forming, pulling coarse, stretcher strains, etc.

Forming qualities are dependent to some extent on the surface finish, and particularly on the temper, which is one of the most difficult properties to determine. Forming qualities are determined by actual tests in the dies, this being the only reliable method. Such indications as color, gloss, bending a corner of the sheet between thumb and finger, doubling entire sheet, bending test samples over on themselves both ways of the grain, tensile strength-elongation and cupping tests are also used with varying degrees of reliability.

Surface inspection is largely a matter of judgment. It would pay every inspection department to send a man

*Paper read before American Society for Steel Treating, Pittsburgh, Oct. 8, 1923.

GENERAL MOTORS CORPORATION

ENGINEERING STANDARDS

MATERIAL SPECIFICATIONS

AUTOMOBILE SHEET STEEL

G. M. C.
1-M

General

1. These specifications cover Automobile Sheet Steel.
2. These specifications are intended primarily to establish a standard nomenclature for Automobile Sheet Steel.
3. These specifications are not intended to supplant the present method of selecting the proper temper and finish by consultation between the producer and consumer, but seek to establish a closer co-operation between producer and consumer and should be regarded as a means to a common understanding.
4. The temper and finish required will be designated by name and symbol letter; for example specification "Regular-B" covers Automobile Sheet Steel in "Regular" temper and grade "B" finish. Temper and finish are described in detail in paragraphs 9 to 11 inclusive.

Process

5. It is recommended that the temper of Automobile Sheet Steel be selected to give the best forming or drawing qualities for the work in hand.
6. Any special requirements, such as oiling, degree of flatness, etc., shall be specified on the Purchasing Agent's order.

Chemical Composition

7. Automobile Sheet Steel shall be made by the Open Hearth or electric furnace process.
8. Automobile Sheet Steel shall conform approximately to the following requirements as to chemical composition:

Carbon	.05 to .15
Manganese	.25 to .50
Phosphorus, max.	.06
Sulphur, max.	.05

Temper

9. Automobile Sheet Steel shall be furnished in the following tempers:
Regular
Deep Drawing
Extra Deep Drawing

GENERAL MOTORS CORPORATION

ENGINEERING STANDARDS

MATERIAL SPECIFICATIONS

AUTOMOBILE SHEET STEEL

(Continued)

G. M. C.
1-M

Permissible Variations

10. Automobile sheet steel in grades "A" to "E" inclusive shall be free from surface imperfections on one side and shall have stamped on this surface the name of mill and heat number. Minor surface imperfections on the reverse side shall not be sufficient cause for rejection.
11. Stretcher strains, pulling coarse and other similar defects developing in the fabricating operations are extremely objectionable in grades "A" to "E" inclusive. The producer shall extend every effort to eliminate these defects.
12. The thickness shall be specified in decimals of an inch, and shall not vary from that specified on the Purchasing Agent's orders by more than the following amounts:

Thickness	Permissible Variation	Corresponding Gage No.
.069	.008	15
.061	.007	16
.055	.007	17
.049	.006	18
.043	.006	19
.037	.005	20
.035	.005	21
.031	.005	22
.029	.004	23
.025	.004	24
.021	.004	25

All dimensions in inches. All variations plus or minus.

13. The width and length of Automobile Sheet Steel shall not vary from that specified more than the following amounts:

	Under	Over
Width	0 1/4 inch	
Length	0	2 per cent

Packing

14. Automobile sheet steel shall be packed in such a manner as to prevent damage in transportation. Grades A to E inclusive shall be shipped with stamped side up.

to the mills and cooperate with the mill inspection. Many times sheets are thrown out at the mill for defects that may be discarded in cutting out the blank from which the stamping is formed. Personal contact and a knowledge of just how certain defects are produced will be very enlightening to any sheet inspector.

Remedy for Stretcher Strains

Stretcher strains are the most undesirable defect to which all sheet is more or less subjected. This defect produces the effect of lines and designs in intaglio and oftentimes is too deep to be removed by grinding. This phenomenon is intimately connected with slip of the individual grains over or past one another. The remedy consists in passing the sheet through cold rolls or a roller leveler.

Stampings should be made as soon as possible after the sheets have been given this treatment. Some shops are laid out to pass the sheets through a roller leveler and immediately into the forming press. One authority states that after the sheet is given the roller leveler treatment, it is in a plastic condition which may set in a few hours or over night, and unless the stamping is formed before this set takes place, stretcher strains will be produced the same as before.

Grain size is a very important factor in the forming quality of the sheet. The grain size is governed to a large extent by the amount of rolling and the annealing temperature. This has been pointed out in detail in a number of published articles.

Scale is the cause of much trouble as it must be re-

moved before finishing. Scale is also very hard on the dies on account of its abrasive nature. Dies used in forming scaly material are often fitted with replaceable hardened steel inserts, which are renewed when worn. The scale referred to here is heavy scale and should be carefully differentiated from the very light thin scale, or better, oxide, that is purposely produced on high grade sheets. This type of oxide is of microscopic thickness and is not broken away in forming. This oxide assists in preventing the sheets from rusting during transportation and storage. On parts that are finished by enameling, it is very important that this oxide is not heavy enough to produce a dull finish.

Seconds Cause Disputes

Seconds are a source of much dispute. It is customary for the manufacturers to include up to 15 per cent seconds in shipments of high grade automobile sheet. These sheets are often a dead loss to the body or parts maker, unless some other stampings are being made which will permit their use. Often the seconds must be used where a cheaper material would have been just as satisfactory.

The Sheet Steel Testing Committee of the Iron and Steel Division of the Society of Automotive Engineers' Standards Committee, have adopted a program for the investigation of automobile sheet steel. The object is to accumulate data which can later be incorporated into a standard specification. This program provides for the following tests which deal with the determination of forming qualities and temper, tensile strength and elongation, Olsen Cup Test, Ericson Cup Test, Rockwell

GENERAL MOTORS CORPORATION
ENGINEERING STANDARDS
MATERIAL SPECIFICATIONS
AUTOMOBILE SHEET STEEL

G. M. C.
I-M

(Continued)

Finish 10. The surface finish of the several grades of Automobile Sheet Steel shall conform to the following requirements:

Grade	Finish	Process	Suitable For
A	Smooth silver, free from oxide.	Full acid pickle with an acid or gas pickle after the last annealing.	Two coat enamel work.
B	Smooth glossy blue edges.	Full acid pickle (Not pickled after final anneal).	Two coat enamel work.
C	Smooth glossy blue edges.	Double pickle.	Three coat enamel work.
D	Smooth semi-gloss.	Double pickle.	Painted bodies. (No sand-blasting).
E	Smooth dull.	Double pickle.	Painted bodies. (Sand blasted before painting.)
F	Dull.	Commercial single pickle sheets.	Any formed sheet metal parts, which do not require the highest finish but do require freedom from scale on account of die wear, such as rocker arm covers, crank pans, dash boards, etc.
G	Dull silver.	Commercial de-oxidized sheets.	Same as "F"; must be sand blasted before painting or enameling. May be substituted in emergency for grade "E" in which case it may require an extra coat of rough stuff.
H	Blue.	Unpickled open or box annealing.	Any sheet metal parts, which do not require high finish and where scale will not cause excessive die wear, such as seat bottoms, seat backs which are covered with upholstering, muffler shells, etc.

Hardness Test, scleroscope hardness, microscopic and macroscopic examination, chemical analysis and bend test.

In order to establish a standard nomenclature for auto sheet steels, the General Motors Corporation have adopted a tentative specification based on finish and suitability for forming certain classes of parts. This specification, given herewith, is drawn up with the full cooperation of the sheet mills and represents as full a knowledge as we now have. It will be noted that no attempt has been made to determine temper and forming quality, as no reliable method is as yet available.

It is hoped that, in time, after sufficient data have been collected, some means of developing standards for temper can be adopted. Cold rolled strip steel tempers have been standardized very satisfactorily on the tensile strength-elongation test and many plants are now buying on this type of specification. The General Motors Corporation tentative specification for automobile sheet steel is offered as a basis for discussion and criticism.

Finding Mechanical Properties of Steel Magnetically

A NOTE on a method for making a magnetic test on steel test specimens to obtain the same information concerning the characteristics of the steel that is ordinarily obtained by the tension test was presented to the French Academy of Sciences by M. L. Fraichet recently. The test bar, subjected to a traction force at constant speed, forms the core of a coil comprising two windings, one a primary winding connected to a storage battery and the other a secondary winding connected to a galvanometer with photographic registration. The diagram thus obtained represents the variation of the magnetization of the bar while subjected to tension. Tests on seventy-eight bars cut from twenty-six different varieties of steel fabricated and heat-treated at the Creusot Works gave the following results:

With the same apparatus and the same magnetizing force, the same grade of steel always gave exactly the same magnetization diagram. This diagram therefore constitutes a veritable chart of identity of the steel and may serve to classify it by.

The magnetization diagram gives all the information obtainable from the traction test, and, in consequence, from the ordinary tensile test diagram (load as a function of the elongation), but with greater clearness and precision than the latter.

True Elastic Limit Defined

In addition, the magnetization diagram indicates a permanent molecular deformation for a relatively low stress, which depends only on the nature of the heat treatment of the metal. This is called the true elastic limit, because it seems to correspond to the beginning of appreciable permanent deformations, which, moreover, do not necessarily evidence themselves in a permanent elongation of the bar and are not recognizable by elongation measurements, however great the precision of these measurements.

It remains to determine the relation between the true elastic limit and the fatigue limit, that is, the maximum stress which may be imposed at an infinite number of times without causing fracture. The ratio of the true elastic limit to the limit of proportionality is 0.7 to 0.95 for carbon steels in the annealed state, and 0.5 to 0.65 for carbon steels hardened in water and drawn, or hammer-hardened. In the case of carbon or alloy steels which are hardened but not drawn and in the case of cast steels, which do not have a very distinct limit of proportionality, the ratio between the true elastic limit and the elastic limit varies between 0.25 and 0.45. The smallness of this ratio seems to explain the brittleness of these steels.

AN arrangement for automatically controlling the feed of an anti-detonating agent has been patented in England by the London General Omnibus Co. It consists of a poppet type of valve in the line through which the anti-detonating agent is aspired, which valve is opened by a spring and closed by the vacuum in the inlet manifold; the latter acts on the valve through the intermediary of a diaphragm. As the load on the engine increases, the inlet manifold vacuum becomes weaker and the spring then opens the valve, permitting the anti-detonating agent to be fed into the carburetor air intake. No mention is made of the anti-detonator which it is intended to use, but from the patent drawings it would seem that the use of exhaust gas was contemplated.

Factories Should Understand Service Problems

Dealers need help in
tool design; prices for
parts should be lower

By J. Willard Lord*

Service Manager, Harrolds Motor Car Co.

EVEN though dealers and distributors may be under contract to take the factory product, we cannot realize keenly enough that we have, in the final analysis, one and the same customer, namely, the car or truck owner. We are very much in the same boat, but further away from each other than is best to secure, quickly and effectively, the results at which we aim and for which we strive.

Engineers and factory men, with exceptions, of course, do not really know us and our problems in the field. We do not get close enough together. You are only casually acquainted—you occasionally pass our front door. I frankly admit we do not know your problems. At the same time, for the benefit of the industry, it is really far more important that you know our problems than that we know yours.

Aside from tools purchased in the open market—almost every shop is working out its own salvation in the matter of tools and according to the ideas of its individual foremen. There is almost no coordinated effort. This means slow accomplishment and needlessly heavy expense.

Would it not pay to establish a factory service paper or include in a factory house organ a tool and equipment section and offer some nominal compensation for designs of tools made and in successful use, and a prize for the best design to perform any given operation? This would dig out good tools hidden away.

WOULD it not pay to hold service conventions at the factories from time to time and stress the matter of repair tools? I believe that from coordinated effort of this kind would come a better tool development and at considerably less cost.

Factories have done something in the way of designing and making up service tools in quantities, thus cutting down the cost. I would like to see much more of it, but in working out the design, see what has been done in the field, where necessity has been the mother of invention. Again, in making up these tools, consider that they will not receive the hard, continuous wear and tear of production tools and many corners can be cut to reduce the cost of producing them.

Another phase of accessibility concerns the ease and facility with which major and minor units may be removed and replaced. This applies more especially to trucks than to cars. Unit exchange greatly reduces the days per year a truck need be laid up for repairs. As truck operators learn more and more how to use their equipment

HERE is a frank statement of some things car and truck factories can do to improve service relations with their dealers. The views given are those of the manager of a big maintenance unit in New York, and are worth serious consideration.

best, they are operating their trucks a greater percentage of the time and are charging to maintenance, rental of trucks hired temporarily while their own vehicles are undergoing repairs.

Greater accessibility and ease of removing and replacing units will do much to help cut down flat-rate charges.

Aside from getting maintenance expense down to rock-bottom through the various avenues open to reduce labor expense, there remains another item to be considered, that of parts expense.

A SHARP line should be drawn between finished commercial parts purchased outside the factories and those parts produced and finished within the plants. Commercial parts, as finished articles, in many cases go through more hands than seems necessary, though there are an increasing number of exceptions. Grease cups and ball bearings were among the first articles for dealers and individual owners to purchase locally. It stands to reason that the more directly all these parts can be purchased, the less the handling charges. This should result in lower prices to owners.

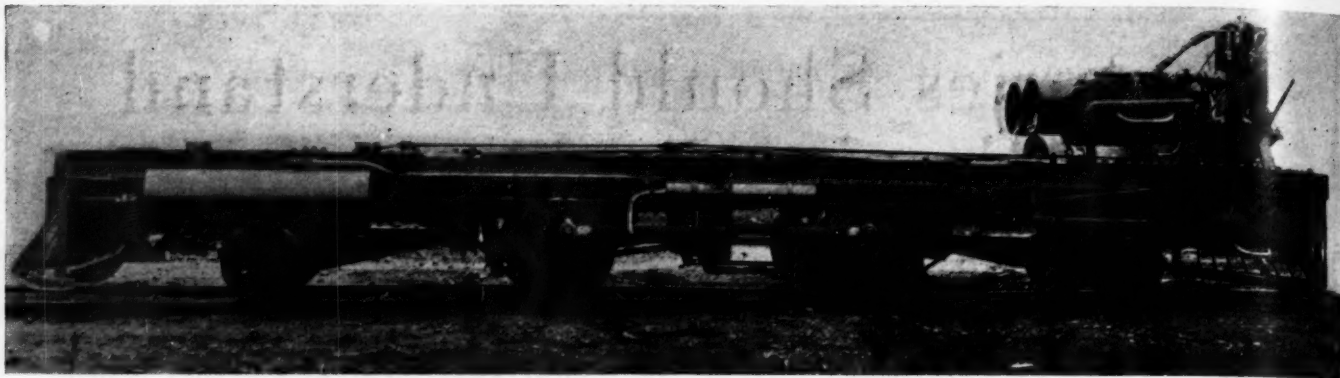
We are told that the factory overhead is one of the principal reasons for the relatively high cost of certain parts when compared with outside prices. Whatever may be the reason, many repair parts which can be obtained far cheaper from parts manufacturers give such service as to compare favorably with the factory product. This being so, does not the production of parts and the pricing of them deserve your attention?

If your production costs are all right, what about the distribution of the burden? If you have a heavy investment charge, would it not pay to adopt the selling methods of these parts makers and offer discounts for quantity purchases and time deliveries?

AS it stands today, every distributor keeps his stock at the very minimum at which he can operate, sometimes below this figure, and the manufacturer is obliged to keep up his stock for the whole country.

There is one other item which would help flat rate service and give a customer the immediate answer as to cost. It is with regard to passing on parts within guarantee. This today is usually a factory prerogative. However, the fact that one company has been able to have its service managers in several localities make the final decision on parts within guarantee, resulting in immediate answer, as far as the customer is concerned, shows that this scheme can be worked out much more generally than is the case today.

*Digest of paper read before Joint Service Meeting of S. A. E. and N. A. C. C., Dayton, Nov. 20, 1923.



Chassis of Drewry railcar with six-cylinder engine, designed to carry a body seating fifty passengers. This car is understood to be in use in Tasmania

Silent Chain Final Drive Is Used on Drewry Railcars

Four and six-cylinder engines are of more rugged construction than those generally employed in truck service. Gearset has two pairs of constant mesh gears. Double bevel arrangement provides three speeds in either direction. Controls duplicated at each end.

By M. W. Bourdon

OF the gasoline railcars made in England, that built by the Drewry Car Co., which has been building this class of vehicle for some fifteen years, is most prominent. One reason for the success of this make is that the director in charge of the manufacturing plant has been successively railroad engineer, truck manufacturer and railcar maker during the past thirty years.

The Drewry railcar's parts are designed for this class of use alone, and they embody features differing radically in some cases from the recognized or standard practice applying to passenger cars and trucks.

Identical specifications for different railcar orders are rare, and the majority of the Drewry output consists of cars specially constructed or modified to comply with the peculiarities of service into which they are to be put.

The greater part of the output hitherto has been sent overseas—to India, Tasmania, South Africa and numerous other countries where climate, gradients, altitudes, curves, class of track and other features may be more or less peculiar to the individual locality.

Gradients in particular are an important factor in each case, for whereas a 25-35 hp. engine may be quite large enough on one line to cope with a vehicle carrying 30-40 passengers and running to a given schedule as to speeds, an engine of double the size may be necessary elsewhere to deal with even a smaller load at lower speeds.

Drewry cars all have certain general principles of construction which have been found best from experience. Most of the cars are supplied with four-cylinder engines and these are standard up to 35 hp. and are used also in some of the largest sizes. A six-cylinder model is of 50 hp. (4½ x 5 in.) and is described in detail hereafter. No special provision is made for insulating the engine or gearset from the frame and no demand has

been made for anything of the kind. The power-unit, gearset and reverse casing are mounted rigidly on sub-frames.

Normal engine speeds are approximately 1000 r.p.m., the maximum being in the neighborhood of 1600 r.p.m. The engines are of a heavy duty type, designed to run continuously for many hours at a time, if need be, at full throttle and at normal to maximum speeds. They have heavier flywheels than the corresponding sizes of truck engines, larger bearing surfaces and generally are of sturdier construction throughout.

The policy of the company is to insist upon providing all their railcars with engines 50 per cent above apparent requirements. The normal maximum car speed specified is therefore attained at approximately three-quarter throttle and at normal engine speed. When a service must be temporarily accelerated, when a driver must make up time because of traffic delays, or when an engine is below par pending some adjustment, there is either power or engine speed in reserve.

Opinions Disagree

This firm does not agree with the opinions of C. E. Brooks (Canadian National Railways), reported in *AUTOMOTIVE INDUSTRIES* of Aug. 9, 1923, that these desirable characteristics can best be provided by the use of a passenger car type of automobile engine able to run up to or above 2000 r.p.m. The company's experience has proved that the lighter type—even the truck engine—will not stand up very long to the peculiar and arduous service of railcar work. The needed flexibility, it is claimed, can be secured fully and economy under light load equally well attained by a heavier type.

In all cases the final drive is by two silent chains, and this scheme has been standardized because experience

has shown it to be the most satisfactory. The chains are not inclosed and have no provision for continuous lubrication; nevertheless, they have been found to be entirely reliable and to have a remarkably long life.

Calls for renewals are said to be extremely rare. In one case cited a car, made thirteen years ago and having tens of thousands of miles to its credit, still has the same pair of chains in use. The secret of this successful application is ascribed to the use of chains of 50 per cent larger dimensions than those recommended by chain makers as suitable.

Chain Cases Undesirable

Chain cases are held to be undesirable; they are difficult to apply in a satisfactory form, are liable to be damaged or bent unless great care is taken by the maintenance staff, and in practice have generally been discarded before they have seen much service. Roller chains have been tried, but, besides being noisy, they have not withstood the high speeds at which they must run.

Advantages of chains as compared with a final drive by gearing include elimination of universal joints and more efficient power transmission. Their duplication in driving to a solid axle halves the risk of sudden transmission failure and they provide a degree of flexibility which is of great benefit in relieving the remainder of the transmission of violent shocks, especially in starting.

Provision is made for both chain adjustment and the rise and fall of the driving axle due to spring deflection. The latter is not of great extent with this type of vehicle, amounting to approximately an inch at most, while under normal conditions it rarely exceeds $\frac{1}{4}$ to $\frac{1}{2}$ in. The chain drive is so arranged that increased spring deflection due to additional load increases the sag of the chain.

Ball and roller bearings for the wheel axles have not, in the experience of this maker, proved successful in practice up to the present, and, although it is admitted that the starting friction could be reduced very appreciably by this means, this advantage has been ruled out by the failures of anti-friction bearings. These failures have been due first to the absence of any insulation—such as is afforded by the rubber tires of trucks—from the small but intensely harsh shocks arising from the metal wheels running on a metal track, and secondly, to

the inexpert and rough handling the bearings receive at the hands of railway mechanics. The latter, all the world over, understand plain bearings but not the anti-friction types, and until knowledge of the latter is more widespread it is believed that the plain bearing is the better compromise because of its greater reliability.

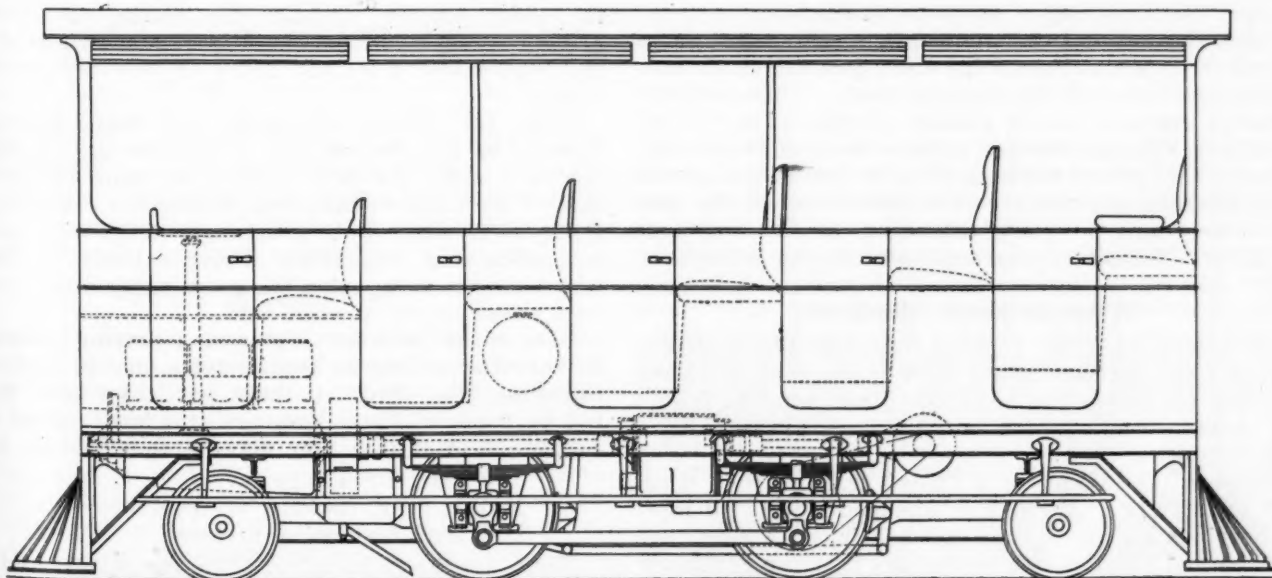
In regard to brakes, the majority of the Drewry railcars are fitted with an automobile (contracting shoe) type on the transmission and a set of shoes applying to the wheels operated by hand through the medium of a lever or screw gear. Air brakes are, however, fitted if desired and a standard Westinghouse system actuating shoes that apply to the wheels as in normal railway practice, is then used. But air brakes are mostly confined to the largest sizes, to which bogey trucks are fitted at each end with the drive taken to the inner axle of each bogey.

It is impossible, as already inferred, to specify any definite ratios between power, speed, carrying capacity, wheelbase or other leading features of the Drewry railcars. There are 20 hp. newspaper vans running in Chile which, carrying loads of 3500 lb., average 35 m.p.h., sometimes 40 m.p.h., between two points 150 miles apart; on the other hand, there are 50 hp. cars of which the normal maximum speed is but 20 m.p.h. with a load of 30 passengers, the requirements of the service being met by that performance ability and yet the gradients call for the use of an engine of that power.

Typical of normal practice in the medium-sized Drewry railcars are two made for the Kalka Simla Railway (Indian State Railways). These have a passenger capacity of 25-30.

Construction Details

Referring in detail to the construction of the first-mentioned rendering of this type, the frame is of channel steel with a subframe supporting the engine and transmission units. It is an eight-wheel car; the foremost and rearmost pairs of wheels are of 15-in. effective diameter and are mounted on pony trucks capable of lateral and vertical movement, the latter against the resistance of helical compression springs. The other four wheels, of 24-in. diameter, are on axles located by horn plates depending from the main frame and are linked together by coupling rods, the latter conveying the drive from the rearmost of this pair of axles to the



Side elevation of Drewry railcar fitted with 50-hp. six-cylinder engine. Of the two center axles, the rear one is driven by chain and the forward one by side rods from the rear one

foremost. The four axle centers are equally spaced, there being 54 in. between each succeeding pair.

The overall length of the car is 19 ft. 6 in.; the overall height 8 ft. 1 in.; the height from rails to top of unloaded chassis 28 in., and the wheel gage 30 in. In this particular example, controls were fitted at one end only, though as a rule they are provided at each end. In the latter event the reverse and gearshift levers are detachable from sockets and transferable to either end.

Brake lever and pedal, the clutch and throttle pedals, and also the small levers for throttle, magneto ignition, etc., are duplicated, though—apart from the sockets of reverse and gearshift levers—no movement from the driving end is conveyed to levers and pedals at the opposite end, the interconnected control rods each having a slotted link at some point.

Duplicate Controls Unnecessary

Although usually provided to accord with instructions, duplicated controls are not considered necessary by the Drewry Car Co., for they point out that steam locomotives on branch lines frequently run backwards for quite long distances and that their drivers are no better situated for observing signals, etc., than the driver of a railcar.

The engine develops approximately 50 hp. at 1200 r.p.m., with a compression ratio of 4.5 to 1; it has six cylinders, $4\frac{1}{2} \times 5$ in., cast in pairs with L heads. There is nothing differing largely from truck practice in the general design of the cylinders except that they have thicker walls than usual; they are bolted to a two-part crankcase of aluminum, the lower half of which supports the crankshaft in seven bearings.

Diameter of the crankshaft journals varies from $2\frac{1}{8}$ in. at the front end to $2\frac{3}{8}$ in. at the rear end; to support the rearmost bearing the crankcase is extended considerably beyond the cylinders, for the journal here is $4\frac{3}{4}$ in. long. The crankshaft is flanged for the attachment of the flywheel, the latter having a separate steel gearing bolted on for the electric starter gear. Pistons are of the straight-sided type in cast iron and have three compression rings, a fourth ring at the bottom of the skirt serving as a scraper.

Gears at the front end of the crankcase are all straight-toothed spur pinions of steel with the exception of that on the camshaft pinion, which is of phosphor bronze. Roller-ended cam-followers are used with an ordinary means of adjusting valve clearances.

Water circulation is maintained by a centrifugal pump located in front of the timing case and driven from a forward extension of the magneto shaft. Three distinct radiators are used in the cooling system. The first of these is an enlarged vertical type in front of the engine. Each of the others consists of a series of horizontal tubes bunched to form a unit at either end of the car, below the frame level and extending the full width of the latter. Behind the vertical radiator is a belt-driven fan.

Water-Jacketed Manifold

The intake manifold leading from the Zenith carbureter is water-jacketed and a valve is provided by means of which the driver can admit air direct into the induction system when running on long down grades with a closed throttle.

Pressure lubrication to a drilled crankshaft is used, with exterior leads through a branched pipe to all journal bearings and to the camshaft bearings. A departure from normal practice lies in the fact that the crankcase has no integral sump, the oil draining by gravity into a separate tank.

An oil pump of the gear type is, however, attached

to the crankcase, projecting through the bottom of the latter and driven by helical gearing and a vertical shaft from the camshaft. It draws oil from the separate tank and delivers it to the branched pipe, already mentioned, with a lead to a pressure indicator in view of the driver. By virtue of this arrangement a larger quantity of oil than could be carried readily in an integral sump can be kept constantly in circulation, thus preventing overheating of the lubricant on lengthy and stiff grades that must be climbed, especially in semi-tropical climates. The driver's seat is on the left of the engine.

From the flywheel the drive is through a fabric faced cone clutch and a coupling shaft to a three-speed gearset in an aluminum case suspended at four points. Plain bearings of phosphor bronze are used throughout this gearset, which provides a direct drive on top gear and reductions through a layshaft. There is the usual pair of constant mesh gears at the front end and another pair at the rear, between these two being a single sliding member on the main shaft and a central fixed pinion on the layshaft. The rearmost gear floats on the main shaft and has internal and external teeth; it is brought into use to provide the lowest ratio by the sliding pinion being engaged with the internal teeth. Direct drive is through a dog clutch and the intermediate engagement is made by meshing the sliding pinion with the one at the center of the layshaft. This makes a quite simple layout, controlled by a lever having a straight through movement.

Behind the main gearset is a reverse gearbox and between the two a coupling shaft having a flange joint at the front and a sliding joint at the rear. The latter allows for chain adjustment, which is attained by sliding the reverse gearbox backward or forward; for this purpose the bolts securing the box pass through slotted holes in the subframe that supports this unit.

Reverse Mechanism

Within the reverse box is a driving bevel engaging constantly with two driven bevels that normally float on a countershaft. Between these driven bevels is a sleeve keyed to the countershaft, but free to slide so that dog teeth at either end can be brought into engagement with corresponding teeth on each driven bevel. Thus the forward and reverse motions are secured, with three speeds in both directions. There is, of course, no differential, the countershaft being solid. Each end of the shaft projects through the casing to carry the driving sprockets of the chain transmission and also, on the right-hand side, the drum of the pedal-operated brake.

From the driving sprockets two silent chains run forward to sprocket wheels secured to the rearmost of the main axles, the axle center being appreciably below that of the countershaft, thus giving the chain drive an angle of 25 deg. Both chains are 4 in. wide and run on sprockets of 1-in. pitch. Drive is taken by the four wheels on the main axles, the pairs being interconnected by a coupling rod at each side.

Gear ratios between engine and driving wheels can be varied according to requirements, and in quoting the following that apply in these particular cars it must not be assumed that these are standard; under easier conditions of service they may be considerably higher.

Top gear, forward or reverse.....2.38 to 1
Middle gear, forward or reverse...3.61 to 1
Low gear, forward or reverse.....7.26 to 1

These are the ratios afforded by the gearset and chain drive, for the reverse bevels—driving and driven—all have the same number of teeth. The chain sprockets have 21 and 50 teeth respectively, driving and driven.

Connecting Rod Production Accelerated by Gang System and Good Jigs

Close limits in dimensions and weight also obtained by methods followed in forging and machining. Cooling in air after straightening eliminates strains, improves molecular structure and decreases distortion. Big end bearing formed by centrifugal casting.

By W. L. Carver

UP-TO-DATE methods in the forge and machine shops are responsible for several desirable characteristics in the Jewett connecting rod. The forge shop is concerned chiefly with the production of an unusually stiff, straight forging of normalized molecular structure within close limits of dimension and weight. Rapid production and close dimensional limits with a minimum of twisting and bending for straightening purposes are obtained in the machine shop by the combination of modern methods of holding and machining.

As illustrated in Fig. 1, this rod is of fairly conventional design, having the lower bearing babbitted in and secured by two bolts. A bronze bushing is pressed into the upper end, forming the bearing for the piston pin which is held in the piston by a lock screw. The shank of the rod is of the usual I-section and is flared at the lower end for greater support and maintenance of true contour of the big end bearing. The lower bearing cap is also ribbed for the same purpose. Brass shims of .010 in. thickness are located, one at each side, at the lower joint. The lower bearing is lubricated by oil under pressure from the drilled crankshaft, while the upper is lubricated by splash through the $\frac{1}{2}$ -in. diameter hole which is drilled at the top of the rod.

Carbon steel having the following analysis is used for this rod:

Carbon	.35—.45	Phosphorus	.04 maximum
Manganese	.50—.80	Sulphur	.04 maximum

The carbon range is somewhat higher than the average, but is specified to insure adequate structural strength without any risk of breakage due to brittleness which might follow the heat treatment of a lower carbon stock for the same strength. Selection of the higher carbon range with the consequent heat treatment produces a rod having a high yield point and a low unit elongation. The combination of these two factors creates a high capacity with a minimum deflection under load.

Shank Is Reinforced

In order to further prevent lateral deflection of the shank which throws a tilting load on the piston pin with consequent pressure and wear on the skirt of the piston in the plane of the pin, a reinforcement is added at the middle portion of the shank. The width of the flanges is increased $\frac{1}{8}$ in. at this point. Since this feature has been included in the design, the rods are tested in the annealed condition and must sustain a load of 875 lb. at the center without permanent deflection when supported on wedges at the upper and lower bearing centers. Before the section at the center was increased, this test was applied in the heat-treated state. The increase has

made the standard easily obtainable with practically no rejections.

Heat treatment and drawback are applied to bring the forging up to a scleroscope hardness of 34-42 and a Brinell reading of 180-255. This treatment produces a forging which machines easily and cleanly and has all of the desired physical characteristics.

An interesting feature is the combination of the drawback and straightening operations. The forgings are heated in a furnace to approximately 800 deg. Fahr. for the drawback and as they are withdrawn, are run through the straightening press before their temperature has fallen to 600 deg. Cooling in the air after straightening eliminates the strains which have been set up by that operation and results in a normalized molecular structure. Naturally, the straightening dies are made with a shrinkage allowance, but the drop in temperature from 600 deg. does not involve any further appreciable warpage. The straightening dies are also sized to bring about a slight elongation of the original forging to the proper finished size.

Straight Forgings Assured

This process in the forge shop insures delivery of straight forgings of correct dimension and the most satisfactory physical characteristics to the machine shop. All operations along the production line are arranged so that no further distortion will be caused by the means of holding the piece or the application of the cutting tool. While some straightening is done, it is of a very minor nature and is performed chiefly to make certain that the alignment is correct. One operation of this kind is performed in the early stages of manufacture in which a slight correction is introduced. The remaining straightening operations have been resolved into inspection after one or both of the bearings have been installed.

Upon receipt at the engine plant, the two faces of the upper end of the rod are disk ground for the first operation. This work is performed in a double-headed Gardner No. 14 straddle disk grinder in order to spot the two faces off square for the Brinell test which follows immediately. No limits are established, as a light facing operation is involved. The rod is carried at the head and in a Vee block at one of the cap bolt bosses. This fixture is mounted on a slide which permits movement toward the centerline of the shafts carrying the abrasive disks. No clamps are used, the operator holding the forging by hand. The Brinell test which follows is performed in a Pittsburgh testing machine equipped with a direct reading hydraulic gage. The limits for this test are 180-255 Brinell reading.

After testing, the rods are delivered to a bench for the third or straightening operation. As illustrated by Fig. 2, a hand-operated bench fixture is used. Each rod is clamped and centered at the big end on the cap bolt bosses in the head at the left side. If necessary the shank is then bent to line up with the floating Vee-block, which is situated just below the head of the rod. This block floats in the vertical plane only in order to compensate for any inequalities on the surface of the bolt bosses that might cause a variation in the angle of the rod in the fixture. As the rod indicates the proper alignment, the shank is gripped by the eccentric clamp above the Vee-block. As required, the head is then given a slight twist so that the hinged gage at the right end of the fixture will clear both faces equally. A single wrench or bar with two jaws is used for any required bending or twisting. One jaw fits over the shank of the rod while the other spans the two faces of the rod head. As each rod passes the gage, it is marked with yellow crayon in the channel nearest the operator. This mark serves as an index for all subsequent operations to insure holding without the introduction of strain or deflection. The price for the straightening operation is based on a production of fifty-five pieces per man-hour.

Both Ends Straddle-Milled

Both ends of the rod are then straddle-milled in a Cincinnati No. 48 Duplex milling machine for the fourth operation. As shown in Fig. 3, a pair of rods is carried in each side of a capstan fixture, one side being loaded while the other is being milled. The rod is again held at the large end in Vee-blocks at the bolt bosses and is aligned with a Vee-block which is positioned to correspond with the similar block on the straightening fixture. The upper end of the rod is retained by a flat jaw having a serrated face. Both upper and lower jaws are cam operated, each cam having its own operating lever. The cams (or eccentrics) in this case are the so-called constant diameter type with a box-type follower and the jaws are therefore positively opened and closed. The four camshafts are mounted in eccentric flanged bushings which are held in the jig frame by four bolts. As the gripping jaws wear, these bushings can be rotated through one-quarter turn for adjustment. Another interesting feature is to be found in the pivot of the jig and the capstan locking device. As the capstan wheel is released, the body of the jig is elevated slightly and therefore clears the base and swings easily.

As Fig. 3 indicates, the cam levers show the effects of hammer operation. Contrary to customary practice, this method of locking heavy jigs is standard in this shop. All jigs and fixtures are designed to be "beaten" and therefore retain their full usefulness in spite of the

strong-arm methods of the usual shop employee. Bab-bitt hammers are supplied in conjunction with all operations requiring extreme rigidity or tight holding; another general characteristic is the cam operation. Wherever feasible, cams and preferably the constant diameter type are used for the retention of work in jigs. It is stated that the cam type has two excellent characteristics: first, high holding pressures are developed easily, and second, operation is simple and rapid.

Equipment Works Rapidly

The combination of the capstan fixture and duplex mill has been found to be very fast and a great improvement over the older layout in which two indexing fixtures were installed at the opposite ends of a horizontal milling machine table. The present equipment has been found capable of producing eighty operations per hour, the limits at both ends being held within 1.495-1.501. High speed milling cutters of 8-in. diameter are carried on the upper arbor and 11-in. diameter on the lower.

Following this operation, the rods are cleaned up by another man at the tote-box beside the machine. Snags and burrs left by the milling are filed off by hand. In this case a contract or gang price is set for the job and two men are easily snagging 1200 rods per day, a portion of this amount coming from the old equipment, which is gradually being retired as obsolete. The contract price policy is in effect on practically all of the incidental operations and many of the major operations in this plant and has proved meritorious. In the first place, a smaller number of men is required for an equivalent volume of production. Proper grouping of operations has resulted in high wages for the men and economical unit costs for the manufacturer.

After the snagging operation, the rods are transferred to a group of two Baker two-spindle heavy-duty drill presses for the drilling of the large holes in both ends, as the sixth operation, Fig. 4. At this station, again, a cam operated fixture is used to very good advantage. A constant-diameter cam is connected by a shaft with a hand lever which, due to the angle of the cam, makes manipulation, by hand only, sufficient for the secure retention of the piece. The cam follower is of the box type integral with an equalizing bar, which carries a three-point jaw head at each end. Thus, each end of the rod is centered and held down firmly against the flat inner surface of the box jig by the operation of a single lever. The same adjustable eccentric camshaft bushing feature is also employed in this jig. Two of these drills, equipped as described and drilling the large end to 2.246-2.2515 in. diameter and the small end to 1.218-1.225 in., have been found much faster than the older equip-

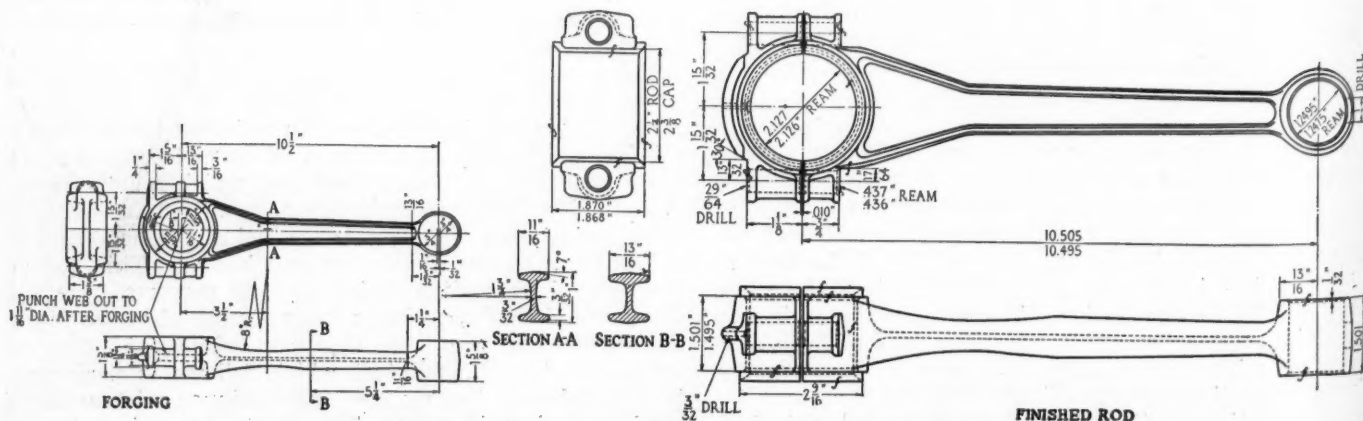


Fig. 1—Drawing showing forging and completely finished connecting rod

ment, consisting of a four-spindle machine with four double fixtures. Although two men handle the older layout and but one man operates the new group, the saving in time required for loading and indexing amounts to at least 20 per cent and the production rate is increased accordingly.

Gang-Price Plan Used

Operations 7 and 8 are again conducted on the gang-price plan and the gang in this instance consists of one and a fraction men. That is, one man can handle both operations with a little help occasionally from another member of the gang. The seventh operation involves drilling the $\frac{1}{2}$ -in. diameter oil hole in the upper end of the rod in a small drill press. An angle fixture of simple design with an equally simple cam detent makes for rapid operation. In the eighth operation, the burr at the inner end of the oil hole is reamed out and the edges of both the upper and lower large holes are chamfered. Another small drill press is used with no particular attempt at jig equipment. A pin is fastened near the edge of the drill press table to anchor the rod and a flat centering plug for the large end is located at the center directly under the spindle. The operator first reams the burr out of the small end of a lot of rods and then installs a large diameter countersink in the spindle and re-runs the rods for the chamfering operations.

Two LaPointe broaches handle the ninth operation of broaching the piston pin bushing hole to 1.2475-1.2495 in. diameter. One man operates both machines and easily attains a production of 1200 per day with ample capacity to spare. The rods are then checked for alignment on an angle plate fixture by swinging them about the broached hole in the small end and comparing the large end with a flat topped plug. This is a bench operation and is included in the gang price-scheme. For example, the man who helps out at operations 7 and 8 has time for the performance of this work.

Milling Bolt Bosses

Next, the rods are passed over to an Ohio tilted rotary milling machine where the bolt bosses are milled and the caps are sawed off. A four-station indexing fixture, Fig. 5, carries pins which fit the large drilled hole in the rod. These pins are slotted for saw clearance and threaded for locking nuts that hold both halves as they are sawed off through the medium of washers having key slots at the center and clearance slots at the periphery. An arbor carrying a slitting saw and two built-up facing cutters saws and mills one side of each rod progressively. The small end of the rod is retained by indexing pins (inside of the fixture) which project into the broached hole. This arrangement for the tenth operation mills ninety rods per hour and is much faster than the older arrangement which required four horizontal milling machines for the production of 1050 rods per day. A snagging operation, in which the burrs formed by the slitting saw at the edges of the large drilled hole are filed off, is accomplished adjacent to this machine. This operation is also based on the gang price policy.

No attempt is made to match rods and caps from this point until the rough boring operation after the babbitt has been cast in. Operations on the separated parts proceed along parallel lines and in some cases overlap, particularly in the babbitting and attendant processes. Following the sawing operation, the rods and caps are delivered in separate tote boxes to a group of two multiple-spindle drill presses where the cap bolt holes are finished in both parts. This group, as illustrated in Fig. 6, consists of one Natco drill set up with eight spindles for the drilling and reaming of the connecting rod and a

Bausch drill, equipped also with eight spindles, for the drilling of the cap holes.

In operation 13 on the connecting rod, four rods are handled simultaneously in each of three stations, the first being utilized for loading, the second for drilling 27/64-in. diameter and the third for reaming to .436-.437 in. diameter. The jig for this operation, as illustrated at the left of Fig. 6, carries a drill plate which is raised and lowered by a pedal control. The drill plate is accurately indexed with the carrier portion of the jig and is also fitted with centering blocks on the lower part of the two rear sides, at which points the drilling and reaming takes place. These centering blocks eliminate the necessity for any method of hand clamping of the pieces in operation. The rod heads are placed in close-fitting slots at the top of the carrier and rest upon the two bolt bosses, which were milled off in operation 11. At the same time the small ends of the rods engage a close-fitting channel at the bottom of the carrier. As the drill plate is lowered by means of the pedal lever, the centering blocks center each rod from the large drilled hole in the big end and clamp the whole group of four at each machining station in that position. The drill head is then lowered into position and the power feed engaged. Because of the elimination of hand clamping, the production at this station is exceedingly rapid, prices being based on an output of 144 pieces per hour. This jig is also designed so that the heavy carrier is elevated slightly from the base for rotation upon application of the control pedal action.

Rod Ready for Bearing Line

With the exception of the chamfering operation which follows, the connecting rod is now ready for delivery to the bearing line. The upper and lower corners of both bolt holes in each rod are chamfered with a small diameter countersink in a small drill press. As the production rate for this job is 315 pieces per hour, this operation is also included in the gang price plan.

As the metal removed in the sawing operation is taken entirely from the cap side of the centerline, the caps are processed through a short additional line at this point for the purpose of restoring them to semi-circular shape. The first or snagging operation following sawing has already been included. The second operation also parallels the rod operations and is performed under the same conditions and with practically the same jig equipment as operation 13 in the rod line. Two 29/64-in. diameter bolt holes are drilled in each cap. As the bosses on the caps are somewhat higher than those on the rod and no reaming is specified at this station, the same three-station method of operation is utilized, but the holes are drilled halfway down at the second station and finished at the third. This jig is identical with that used on the rod job and the production rate is about the same.

Bolt Holes Chamfered

In the next or third operation, these bolt holes are sized and chamfered in a small drill press. Although the holes have been drilled with a 29/64-in. diameter drill in the previous operation, a 29/64-in. diameter reamer is run through as a precautionary measure. The chamfering operation then follows after the same manner as with the connecting rod. As the production rate at this station is 217 pieces per hour, the gang price plan again applies.

Upon delivery to a four-spindle Foot-Burt drill, the caps are rebored in pairs for the fourth operation, as illustrated in Fig. 7. Although a four-spindle machine is utilized at present, but two spindles and two jigs are required for the production of rod caps for 200 engines

Many Small Economies Result in High Degree

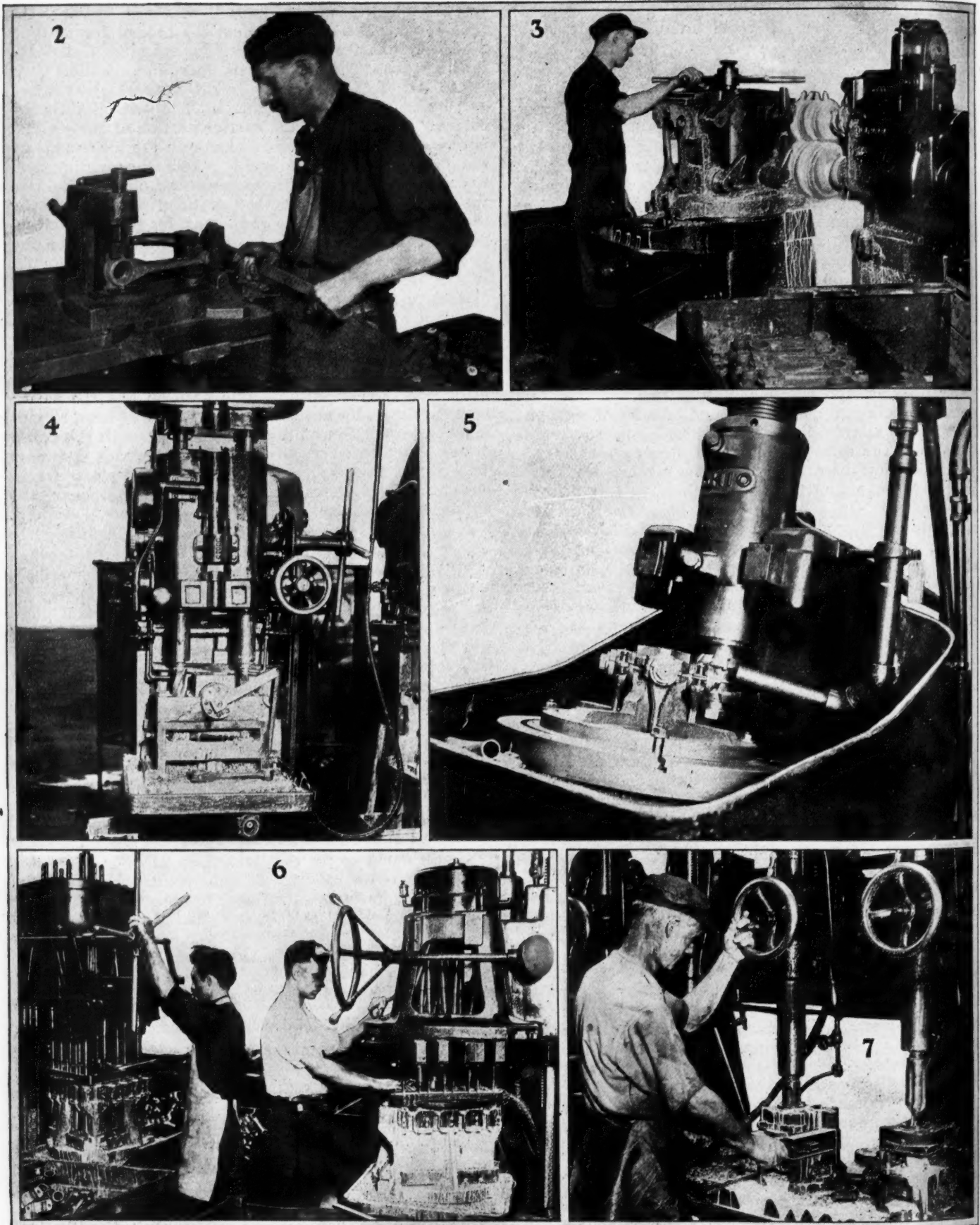


Fig. 2—Straightening fixture showing head of rod being set after shank is lined up with floating Vee block. Fig. 3—Capstan double end milling jig. Fig. 4—Double end drilling jig which is closed by a single hand lever. Fig. 5—Progressive sawing and milling fixture. Fig. 6—Bolt holes in rods being drilled in jigs requiring no hand clamping. Fig. 7—Simple jig which locks caps by cam action

of Efficiency in Making Jewett Connecting Rod

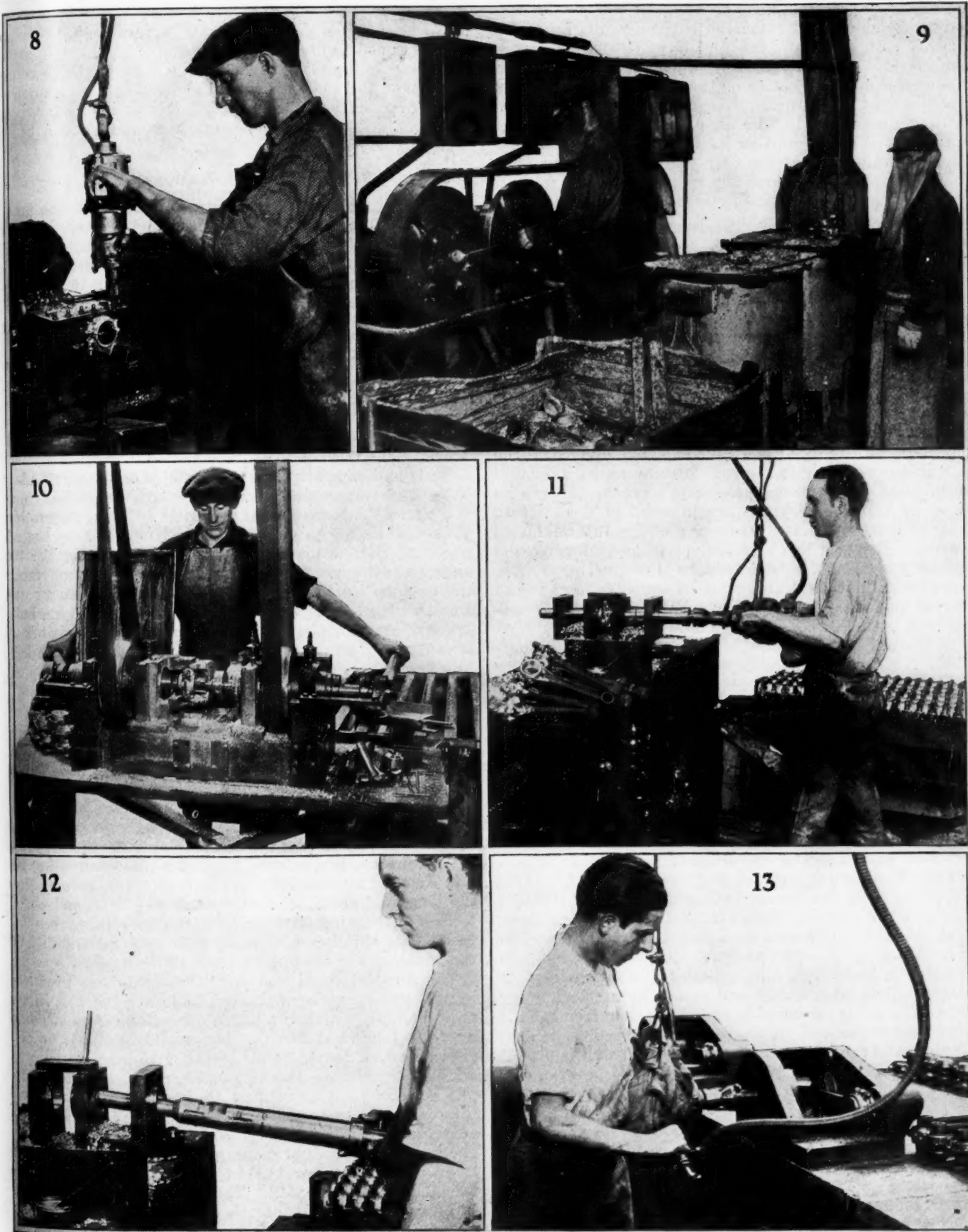


Fig. 8—Bolting on caps in bench fixture. Fig. 9—Babbitting and tinning line. Fig. 10—Double-end machine for semi-finishing bore and finishing ends of babbitt bearing. Fig. 11—Finish reaming babbitt bearing. Fig. 12—Close-up of finishing reamer. Fig. 13—Line reaming piston pin bearing.

per day, the standard rate being 130 pieces per hour. The jig equipment here is another illustration of the practice in this shop. Two caps are slipped in face to face on pins passing through the bolt holes. An arm having a cam-shaped extension is then swung around to contact with the outer cap and is gripped by a slotted hand lever. A normal pressure on the hand lever exerts a powerful gripping action on the caps. Fig. 7 also illustrates a type of drill which is in general use for rough drilling operations in this shop. A high speed spiral-fluted bit is bolted and keyed to a carbon steel shank having straight flutes for chip passage. A gang price snagging operation follows the re-boring for the purpose of removing the fin at the inner edges of the shim surfaces. After inspection the caps are delivered to the bearing line.

Low Labor Costs for Babbitting

Although several operations are involved in the babbitting and bearing finishing line, the number of men is small, as the work is divided into groups, each comprising two or three operations. Since no attempt is made to match rods and caps after sawing, the first operation in the bearing line, or the fifteenth in the rod line, consists of the assembly of these two parts. The bench fixture illustrated in Fig. 8 is utilized for this work. Special bolts with reduced diameter ends are slipped in the bolt holes and the nuts are run down by an electric stud setter fitted with a hexagonal socket wrench. Aluminum shims of 1/16-in. thickness are inserted at the joint in order to leave a gap for the sawing of the full babbitted bearing. Between this and the operation following, the assembly is painted with kalsomine mixed with gasoline, in order to limit the tinning action which follows to the bearing surfaces. After the caps, bolts and shims are assembled, both sides of the big end are spot-faced slightly to prevent leakage of babbitt during the casting operation. This work is done in a small drill press carrying a spot-facing tool. The rod is mounted upon a pedestal fixture having a centering plug at the upper end and an extension arm to prevent rotation of the rod with the tool. The work at both these stations is priced on a gang basis, provision being made for two men.

Acid Applied to Bearing Ends

At the next station the bearing ends of the rods are painted with acid, tinned in an electrically heated furnace and passed to the operators of the babbitting machines. The tinning furnace and one battery of the two babbitting lines are shown in Fig. 9. The tinning furnace and two electrically heated babbitt pots are lined up in the center with an aisle at each side for the accommodation of the babbitt pourers. Each babbitting line comprises a battery of four spindles equipped with face plates, individual clutches and pedal-operated clamping disks. The rod is anchored at a pin in the small end and is clamped at the center. A locating pin between the clamping plate and the face plate centers the rod as it is placed in the fixture. After the rod is tightly clamped, the clutch is engaged and the liquid babbitt is poured in the small circular opening in the clamping plate. As four stations make up each line, the operator then goes on to the next and permits the rod to rotate while the other three stations are loaded and unloaded. The clutch driving each station is released as the operator unloads the preceding fixture. When the spindle stops the babbitt has set and is ready for removal, which is accomplished by depressing the pedal. This group of operations is also handled on a gang basis, each of three men being paid equally.

Rough babbitted rods are then passed under a rotat-

ing wire brush for the purpose of removing any excess babbitt which has accumulated in the centrifugal process. A grinder stand, equipped with a steel brush wheel, is used for this operation, which is the nineteenth in the rod line. As the production rate is very high, this work is performed by one of the members of the gang engaged in the finishing of the rod bearing. From the brushing operation, the rods are passed along a bench to an operator, who removes the nuts and drives out the bolts. A reversed stud setter, an ordinary hammer and a bench fixture comprise his equipment.

Three Operations

Three gang operations follow. In the first, the fin of babbitt joining the rod with the cap is sawed out in a hand mill, being indexed from the piston pin hole. Following this operation, the babbitt fin is ground flush with the shim surfaces of both rod and cap in a double-headed Badger No. 4 disk grinder and the tops of the reinforcing ribs on the caps are spotted for the drilling operation which follows. The 3/32-in. drain hole is then drilled through the steel cap and its babbitt liner in a small drill press. No fixture is used for this operation, as the cut is light and the cap is easily retained by hand in the approximately correct position. Two men handle these operations and the wire brushing which has already been described.

Rods and caps are then reassembled with the standard bolts and nuts and the standard .010-in. thick shims preparatory to the actual bearing finishing operation. This work is performed at a bench and requires the entire time of one man for a production of rods for 200 engines per day. In the next or twenty-fifth operation the babbitt bearing is core drilled to 2 in. diameter in a small drill press equipped with a simple box type holding fixture. This operation forms part of the work of another gang that is engaged in final finishing the babbitt bearing.

Near Finishing Operation

At the next station another member of this gang finishes the ends of the bearing and rough reams the bore preparatory to the final finishing. A special double-opposed head machine has been designed to do this work. The rod is clamped at the bolt bosses against a fixed plate and is squared up by a pin in the upper end. The head at the left of Fig. 10, carrying chamfering and spot facing cutters, is advanced first. As this head is backed off, the head at the right is advanced. The reamer sizes the bore to 2.116-2.120 in. diameter and a second chamfering and facing tool finishes the remaining bearing face. The spindles are fitted with stop collars to hold the width of the bearing to 1.868-1.870 in.

The finished faces and rough reamed bore produced by the last operation are used to locate the rod in the final reaming, which is a bench operation. A cutter bar, which is piloted at three points, carries a single adjustable blade of considerable length and is driven by an air drill through a pin and jaw clutch, as shown in Fig. 11. A short pilot barrel just ahead of the cutter centers the rod on the cutter bar at the same time that the bar is centered in the two outer bushings of the fixture. The cheeks of the rod bearing are then clamped by the lever operated screw bushing, which is shown in the open position in Fig. 12. The barrel of the bar tapers throughout the length of the cutter to the full finished diameter of the bearing at the rear edge of the tool. This diameter is extended for a short distance for the purpose of following the cut with a burnishing action.

An exceedingly smooth finish is produced by the combination of the single blade reaming cut and the burnish-

ing operation. The cutter, as shown in Fig. 12, is stoned to produce a finished diameter of 2.126-2.127 in. All bearings are held within in these limits and are fitted to the crankshaft with no further finishing of any kind. A similar set of limits on the final crankshaft grinding operation makes this method both feasible and economical. Two reaming fixtures are set up on the same bench, one being operated continuously and the other intermittently by another member of the finishing gang. Final inspection of the width and bore of the bearing by snap gages is performed at the opposite side of the same bench.

Bushings Pressed In

The rods are next delivered in carriers to the piston pin bearing line which is adjacent to the engine assembly line. The bronze bushings are pressed in at the first station in this line. A hydraulic press equipped with a disappearing pilot is utilized, the operator dropping the rod and the bushing just above the head of the rod over a spring actuated pilot. As the ram comes down the spring actuated pilot telescopes into the permanent base. An interesting development is found in the bushing container at this point. A rather high box with a side opening at the bottom, similar to an old-fashioned match box or coal bin, brings the bushings immediately to the operator's hand with no necessity for reaching at any stage of supply.

Weighing and distribution of the rods into sets of six having a variation of plus or minus $\frac{1}{4}$ oz. then follows. Each set of six is then identified by stamping a serial number on the shank of each rod. A simple wooden holder carries the rods with the flanges of the I-section up for this operation. Each set of six is then passed across the bench to the line reaming operation, illustrated in Fig. 13. As each rod is passed over, one bolt in the head is loosened slightly. The slack which results allows the large bearing to slip over the floating pin shown at the right end of Fig. 13. The bolt is again drawn tight and the floating pilot pin pushed back until the head of the rod rests against the rear support. The screw bushing is then turned up and the bearing reamed, as shown.

The assembly then travels across the same bench again for the final broaching operation. Hydraulic presses and short compression broaches finally finish the piston pin bushing. Plus or minus limits of .005 in. for length center to center are established at the line reaming operation and as the broaches center in the reamed holes, no variation is created. The rams of these presses are equipped with special heads which cause the broaches to drop out as the cut is completed.

Rods Fitted with Pistons

At this point the final assembly line takes over the rods which are next fitted with pins and then pistons, after which the entire assembly is again checked for alignment. Little or no adjustment is found necessary at this station, as the methods which have been described maintain the alignment of the rod throughout the entire machining process. As stated previously, the rods are installed in the engine with no further fitting and are given a run-in on stands built for that purpose prior to complete assembly and final test.

In addition to the various gang-payment groups involved in the production of the connecting rod, the engine assembly line is operated on the same basis. This plan has several advantages: In the first place, the gang is "self-cleansing"—a loafer or incompetent is quickly located from within the gang and does not last long after detection. Old-fashioned labor-driving methods of su-

pervision are not at all necessary as each man is spurred to his best effort. Any reduction in the number of men means a corresponding increase in individual wages. While a reasonable working minimum number is necessary for the maintenance of the proper standards of quality, the gang or group will not tolerate increased numbers without a corresponding increase in production. Finally, as the gang is responsible as a whole, each man is vitally interested in the quality of the engine as a whole engine in addition to his own contributing portion of the line operation.

Several difficulties are also eliminated by the adoption of this policy. As production fluctuates, no change in the number of stations follows. The line is complete as it now stands. Greater production can be obtained by filling more stations on a continuous basis. The possibilities of high production are always present, but operators are not required to produce a maximum at only one station in order to make wages that will keep them on the job. In view of the intermittent operation involved, this plan is not ordinarily put into effect on machines or operations involving a large investment. Such machines are worked close to their capacity. In the design of each piece of tool equipment, the requirements and characteristics of both policies are carefully borne in mind. If the investment in machine equipment is high, a corresponding amount is spent in jig and fixture equipment to insure the maximum of production. If gang operation appears to be the more feasible, the simplest, most economical form of equipment is adopted.

Nearly Half New Zealand's Tires Are American

COMPARATIVE figures relating to the importation of tires for motor vehicles in New Zealand show a startling decrease from previous years, according to a report to the Department of Commerce from Consular Clark Hathaway, at Wellington, the total value of the 1922 imports being £478,230, a little over half the figures for 1918, 1919 or 1921, and a quarter of the 1920 importation, but imports of American tires made up a much larger proportion of the total than in 1921.

The following table shows the countries from which tires were imported during the last two years, and the percentage of trade secured by the various countries:

	1922 Per cent	1921 Per cent
United States	41	34½
France	29	19
Canada	17	9
Australia	7	22½
United Kingdom	6	9
Italy	—	5
Belgium	—	1
	100	100

America and France, it will be noted, have largely increased their percentage at the expense of England and Australia. The drop in the Australian figures from 22½ per cent in 1921 to 7 per cent in 1922 is probably due to the failure of the Australian tire manufacturers to develop a satisfactory cord tire and to the fact that new import duties on tires were imposed in January, 1921.

Australia was placed on the general list, with tires from that country taxed 25 per cent, against a 10 per cent tax for English and Canadian tires. A reciprocal agreement has now been arranged between New Zealand and Australia which places Australian tires on a more favorable footing.

Volume of 1923 Truck Production Cause for Optimism

No reason for disappointment because gains in commercial vehicle manufacture have been less than in passenger car field. War reaction still being felt. Development in next five years likely to be great. Highway transport grows fast.

By James Dalton

DISAPPOINTMENT has been expressed in some quarters because truck production has been no larger this year in view of the extraordinary demand for passenger cars. There appears little real justification for this view of the situation.

Output of commercial vehicles for the first ten months of 1923 was 324,605, which was greater by 2566 than the best previous record for a full year, which was established in 1920 with a total of 322,039. The total for all of 1923 probably will reach about 375,000 or 380,000.

It should not be forgotten that the motor truck is only about five years old as a real instrument of highway transport on an exclusively commercial basis. Its rapid development prior to that time had been due largely to necessities arising from the World War.

Almost as soon as hostilities started in 1914, the warring nations gave large orders for motor transport to American manufacturers. This resulted immediately in a rapid increase in production. As soon as the United States entered the conflict in 1917, there was a desperate effort to turn out enough trucks to meet the military needs at home and abroad.

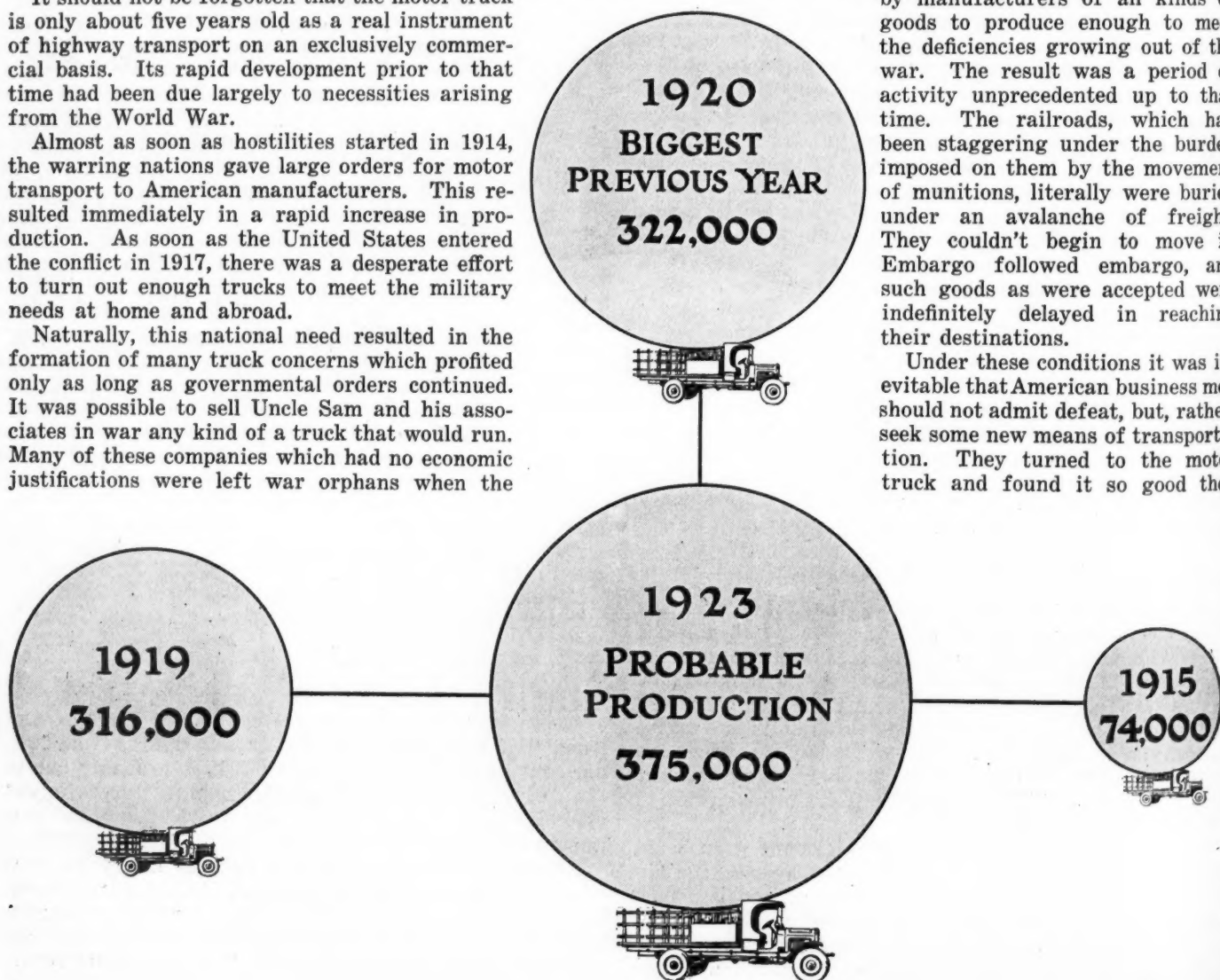
Naturally, this national need resulted in the formation of many truck concerns which profited only as long as governmental orders continued. It was possible to sell Uncle Sam and his associates in war any kind of a truck that would run. Many of these companies which had no economic justifications were left war orphans when the

armistice was signed and have since passed out of the picture.

In these war years the percentage of truck production as compared with passenger cars naturally was large. This was not due to any lack of demand for passenger automobiles, but, rather, to martial necessities which forbade the use of men, materials or factory space for the production of anything not absolutely essential. Output of cars, therefore, fell far short of demand.

With the coming of peace, a frenzied effort was made by manufacturers of all kinds of goods to produce enough to meet the deficiencies growing out of the war. The result was a period of activity unprecedented up to that time. The railroads, which had been staggering under the burden imposed on them by the movement of munitions, literally were buried under an avalanche of freight. They couldn't begin to move it. Embargo followed embargo, and such goods as were accepted were indefinitely delayed in reaching their destinations.

Under these conditions it was inevitable that American business men should not admit defeat, but, rather, seek some new means of transportation. They turned to the motor truck and found it so good they



clung to it tenaciously. That was the real beginning of highway transport and it resulted in an abnormally heavy demand for commercial vehicles.

Then came the slump in 1920. Business of all kinds fell away sharply. It was inevitable that the need for trucks should be much less pressing. Owners of fleets put part of their equipment into storage and there were mighty few buyers. On top of that, speculators started dumping into the country, duty free, large quantities of reconditioned trucks, formerly used for military purposes, which foreign governments were glad to sell for a song. Such truck buyers as there were naturally turned to these vehicles and manufacturers suffered most severely. This flood eventually was shut off by the imposition of a 90 per cent import duty.

Not until the end of 1921 did business swing upward. Its recovery was slow at the beginning and it was some time before the truck equipment available was put to work. Necessity for the use of such vehicles for long hauls and the uneconomic transportation of goods which had existed prior to 1920 had vanished, for the railroads were again suffering from lack of business. It was not surprising, therefore, that the volume of purchases was not large.

Along in 1922 the volume of general business had reached such proportions that interest in truck buying revived and production in that year reached the very respectable figure of 252,000, which was 10.5 per cent of

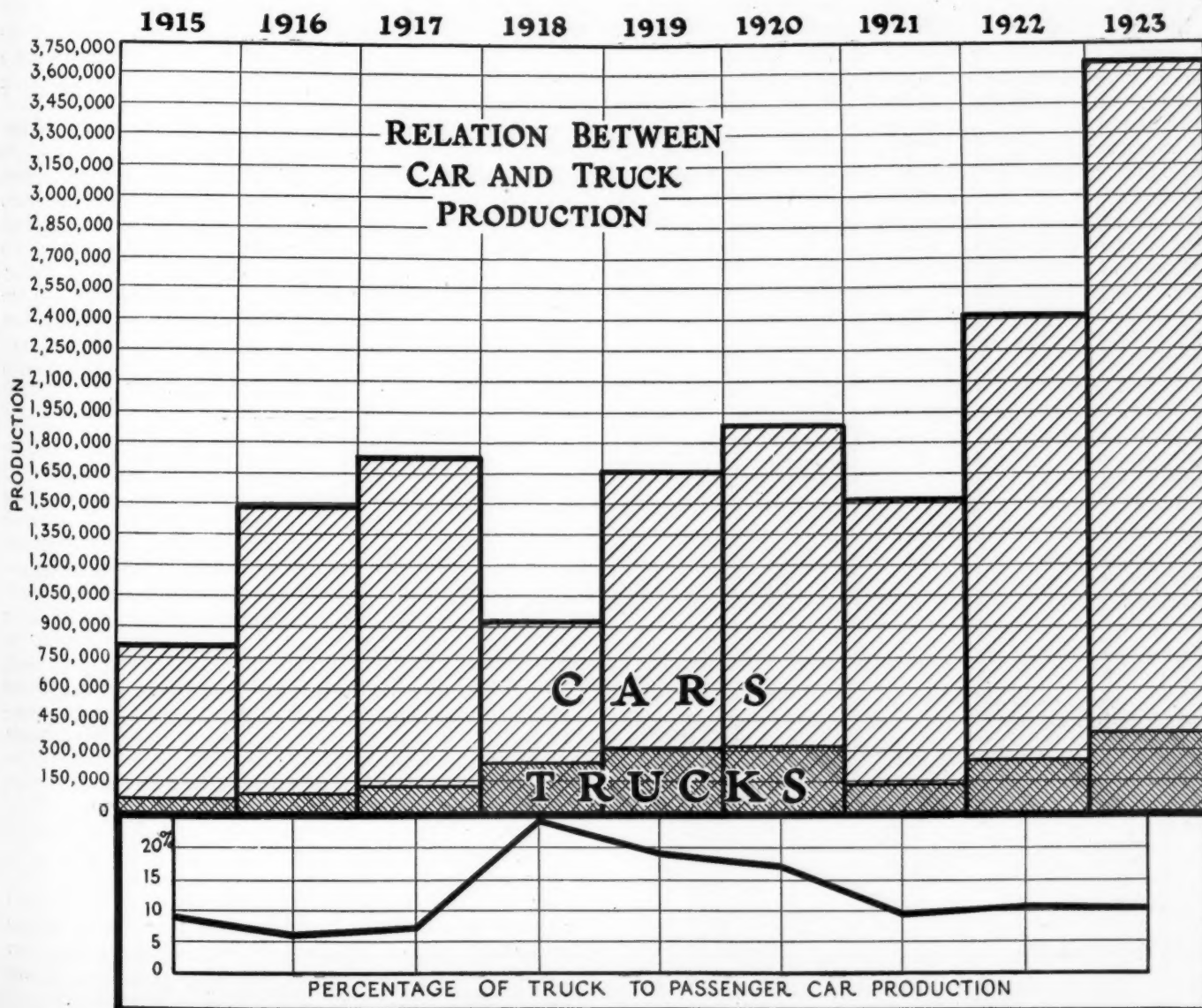
the passenger car output and was larger than for any previous years except 1919 and 1920. It is of interest to note that truck output in 1920 was 19 per cent of the passenger car production, while in 1921 it was 9.6 per cent. Thus far this year it has been 9.6 per cent. Percentages for the five years prior to 1920 were: 1915, 9; 1916, 6; 1917, 7.3; 1918, 24.5; 1919, 19.

1923 Breaks Record

In point of units the 1923 output has exceeded all previous records, even that of 1920, when the volume of general business had reached the after-the-war peak both at home and abroad. The truck market under normal conditions is dependent in large measure upon the general business situation. When it has grown by leaps in the past some abnormal condition has been responsible.

There has been no such backed-up demand for commercial vehicles as there has been for passenger cars. Many more than were required in the normal channels of commerce were turned out during the war, and when it was over many of them found their way into trade. As a consequence, except for military purposes, production has kept abreast of commercial needs. This does not apply, of course, in nearly so great a degree to lighter vehicles, such as delivery wagons, for which there always has been a ready market.

It is probable that a good many of the trucks which



were manufactured during the war period or immediately thereafter are just beginning to wear out and need replacement. As they go to the junk pile the call for heavy duty vehicles will become more insistent.

Under the circumstances there is little justification for disappointment at the size of the truck market. The next five years will bring a development in highway transport which will be comparable to that which has taken place in the last five. Because of road surface limitations the trend is away from trucks of the heaviest types, but those of somewhat smaller capacities will appear in constantly increasing number, keeping pace with the growth of trade and industry.

The volume of the nation's business is evidenced by the fact that in 1923, which has been regarded in many quarters as somewhat lean, it has been larger than in any previous year, not even excepting the twelve months which preceded the slump of 1920, generally regarded as the peak for all time.

When highway transport is coordinated with other

forms of transportation on a scientific and economic basis, as it inevitably will be sooner or later, there will be a greatly expanded market for commercial vehicles, both in congested terminal areas and on the roads. With suitable regulation and protection against unfair competition, motor freight lines will be organized in all sections of the country.

The market for the motor bus in urban, suburban and rural service scarcely has been scratched. Its use will expand step by step with the development of the improved highway system of the country. If there are any skeptics they should study the amazing extension of bus operations in the past eighteen months in such States as North Carolina and Louisiana, where good roads are only four or five years old.

It requires vivid imagination to visualize the future of the motor truck at home and abroad. As the picture unfolds year by year it will be seen how little basis there was for worry because production in 1923 did not reach still higher levels.

Novel Design Features in New Lathe

NOVEL features are incorporated in a new type of lathe produced by the Walcott Lathe Company. Instead of overhanging the bed of the lathe at the back, the gear box containing the all-gear drive is designed entirely within the head end of the bed casting. The main driveshaft carrying the drive pulley, which incloses an expanding clutch, is located near the bottom of the bed casting on the approximate vertical axis of the bed section. The drive is carried up to the work spindle through a train consisting of change gears mounted upon two intermediate shafts that are also located on the approximate centerline of the bed section. This arrangement of headstock drive is unusually free from vibration and is very compact, permitting better utilization of limited floor space.

The feed or carriage drive is not based upon spindle speed but is specified in inches per minute, ranging from 0.4 to 2.4 in. per min. in 42 selective positions. Twelve different spindle speeds are also available, being set by the gearshift levers on the gearbox inclosure. When shifted from the feed rod to the screw operation of the carriage, the headstock gears may be set for cutting 504 different thread combinations.

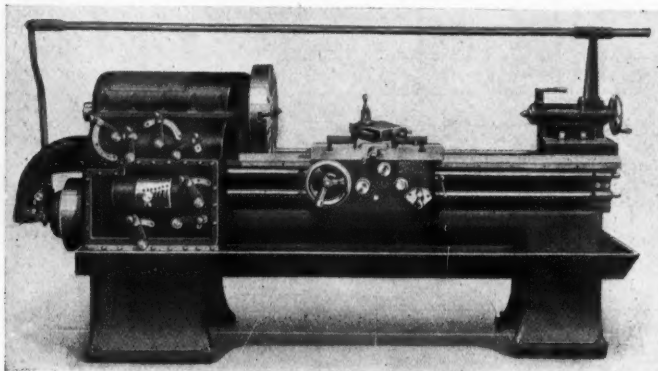
Inspection and repairs of the hardened gear train and shafts may be carried on through a large opening in the front of the headstock which is closed by the plate

carrying the shifter levers. The machine is started and stopped by a shift rod extending the whole length of the bed and operating the main clutch. An unusual feature is the over-arm which supports the outer end of the main drive shaft.

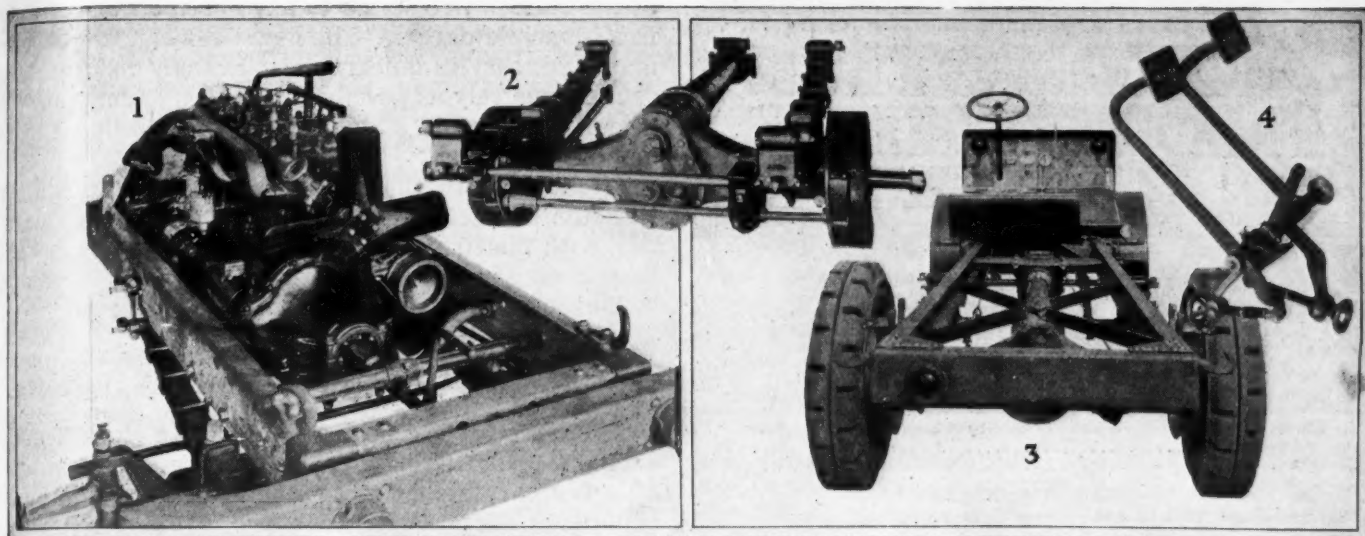
All bearings in the headstock are full bronze bushings, with the exception of those on the spindle, which are split. Lubrication is furnished by a gear pump driven from the main drive shaft. Oil is pumped from the sump to the topmost position, from which it returns by gravity, lubricating all gears and bearings. These lathes are built in eight sizes, ranging from 10-in. to 30-in. swing, varying by increments of 2 in. up to and including the 20-in. size and rounded out by the 24-in. and 30-in. sizes. Bed lengths are 6, 8 and 10 ft., although any length will be built to order. All sizes are fitted with thread cutting dials and taper attachments.

Arithmetic of Distribution

A TECHNICAL note on The Arithmetic of Distribution by Stanwood W. Sparrow of the Bureau of Standards has been published recently by the National Advisory Committee for Aeronautics. Sparrow gives curves showing the variation of the indicated mean effective pressure and of the specific fuel consumption in a single cylinder Liberty engine with a compression ratio of 5 to 1 at a speed of 1400 r.p.m. under part load, with the air-fuel ratio of the mixture. From these curves the percentage change in the mean effective pressure and in the fuel consumption for a given percentage change in the mixture proportion can be readily calculated. Calculations of variation of the m.e.p. and fuel consumption are made for a six-cylinder engine if 5, 4, 3, 2, and 1 of the cylinders receive a charge that is 20 per cent leaner, 40 per cent leaner, 50 per cent leaner, 20 per cent richer, 40 per cent richer and 50 per cent richer than the charge delivered to the remainder; also for the case where the charge of one cylinder is 20 per cent leaner and that of another 20 per cent richer than the charge of the other four. The results arrived at are then plotted against the fuel mixture proportion.



New Walcott lathe



1—Front end of truck showing handy fan belt adjustment, and substantial front end engine support. 2—Rear axle, brakes and rear springs. 3—Rear end of truck, showing frame bracing, torque tube support and towing hook. 4—Brake and clutch adjustments

New 2½-Ton Bessemer Truck Is Designed for Heavy Duty

Special cone type clutch is used. Prominent parts makers build units comprised in chassis. Five wheelbase lengths furnished. Tandem-duplex drive rear axle of semi-floating type employed.

A NEW 2½-ton truck designed for heavy duty service has been put in production by the Bessemer Motor Truck Co. of this city. It is fitted with a Hinkley engine, the 4¼ or 4½ in. bore engine being used, at the option of the purchaser, the stroke in each case being 5½ in. Ignition is by an Eisemann magneto, and the Bijur starting and lighting outfit is employed, in conjunction with a Westinghouse storage battery. No governor is fitted, its place being taken by the Bessemer Moto Control, a device mounted on the dash and indicating to the driver whether the engine is running at low, normal, maximum or danger speed, as well as the speed at which the maximum fuel economy is secured. This instrument is said to be a great help to the driver in determining when is the best time to shift gears.

Water circulation is by pump, a 20-in. four-blade roller-bearing fan being mounted back of the radiator and driven by a belt whose tension can be adjusted by means of a hand wheel. The cellular radiator core is surrounded by cast aluminum members and is protected by a nickel-plated channel iron radiator guard. Cooling fins are cast on the upper tank.

Clutch Construction

The clutch is of the Bessemer Company's own make and is of the cone type. It has a leather facing, which is secured to the cone by means of T bolts, so that it can be easily removed when worn. Provision is made for the application of neatsfoot oil in the rim of the cone, to always keep the leather soft and pliable. The clutch is completely inclosed and its spring pressure, as well as the clutch brakes, can be readily adjusted, the former through a hand hole in the case. The shaft on which the

clutch pedal and brake pedal are mounted is carried in self-aligning bearings, so that no binding action takes place when the frame is distorted.

The gearset is a Brown-Lipe and is separately mounted, having a three-point support. Blood Brothers universal joints are used in the propeller shaft, which is cut in two to obviate whirling. Driving thrust is taken on radius rods with spherical connections, while the torque reaction is taken on a torque tube surrounding the rear section of the propeller shaft. This torque tube has a ball and socket support at the forward end.

Axle Type Described

A tandem-duplex drive rear axle of the semi-floating type is employed, and an option is given on the drive ratio. The front axle is of Shuler make, with a 2-in. axle bed. All springs are made of silico manganese steel. The front springs are 40 by 2½ in. and contain ten leaves; the rear springs are 56 by 3 in. and contain fourteen leaves. Springs are mounted on leather pads and secured to the axles by clips of 3½ per cent nickel steel. All spring eyes are bronze bushed for ⅞-in. shackle bolts.

Side rails of heat treated stock are used in the semi-flexible frame. A substantial pressed steel bumper, backed up by heavy coiled springs, is mounted at the front of the frame. The wheels are of the artillery type, 36 in. in diameter, and carry 4-in. solid rubber tires in the front and 8-in. in the rear, while steel wheels and pneumatic tire equipment can be furnished if desired, at extra cost. Both the Alemite and Oilkipp systems are used for chassis lubrication. The chassis is built in the following wheelbases: Short, 142 in.; standard, 160 in.; long, 175, 184 and 195 in.



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Action on Balloon Tire Standards

Standard rim sizes for balloon tires have been decided upon. The first step has been taken in a thoroughly constructive effort to keep down costs in the manufacture of the new tire types, to simplify service difficulties, and to lighten the inventory burden of tire dealers.

How far the industry will benefit from the forward-looking agreement made by tire builders depends entirely on the cooperation accorded by car and light truck manufacturers in using the sizes decided upon.

Some tire maker is almost certain to come forward to meet demands of a car manufacturer who insists on going his own way in having a special size of tire and who refuses to make any concessions for the good of the industry. Particularly is this true if the manufacturer be a good-sized producer.

The economies in producing, stocking and merchandising to be achieved through a wholehearted acceptance of the standards, however, are so great as to far outweigh slight immediate difficulties in conforming to the selected sizes.

Service to the owner has become, perhaps, the most potent factor in selling cars today, and the industry as a whole can prosper only through giving service as cheaply and as effectively as possible. The advent

of the balloon tire seems to have been a real advance in automobile design. The new tires can be put into maximum service quickly only through making them as inexpensively as possible and through enabling the dealer to stock and service them with minimum trouble and expense.

The automotive industry has a chance to achieve immediate practical results through sincere cooperation with the tire makers in using the standards that have been set for balloon tire rim sizes. It should make the most of its opportunity.

Undue Stress on Spring Sales

"We have got our dealers to agree to stock heavily during February and March," said the sales manager of a big car factory, "as they have found in their experience that 60 per cent of the automobiles are sold during the spring months." If this statement is true, the dealers for the particular car in question have been having a unique experience.

A certain amount of stocking up for spring trade is necessary, undoubtedly, but facts on past sales show clearly that the general economic trend influences car sales far more strongly than does the seasonal. Production follows the retail market fairly well in the automobile industry, taken over a period of years. And production figures show that in no year since 1912 has more than 35 per cent of the total production for the year been turned out in a single quarter.

Moreover, the quarter in which sales were the highest has not always been the one including the spring months. Scanning the data covering 1912 to 1922 inclusive, it appears that the second quarter, (which includes April, May and June) was the highest in 1912, 1913, 1914, 1916, 1917, 1920 and 1922; that is, in seven out of eleven years—63.6 per cent of the time.

In calculating the number of cars dealers should stock for the spring trade next year, the chief consideration should be the probable trend of business as a whole, rather than the effect of weather on sales. Unquestionably, seasonal influences exist in automobile selling, but their effect on actual sales volume is less than that wielded by general economic fluctuations.

Research Pays: See That It Is Supported

No engineer worthy of the name, and few executives who wish to see the automotive industry advance, doubt the value of research or fail to give it at least their moral support. In spite of this fact there is grave danger that one of the most valuable research organizations in point of value to the industry will be so handicapped next year that its usefulness will be undermined and the volume of its work greatly curtailed.

We refer to that section of the Bureau of Standards which handles most automotive research problems. This section has never been given adequate support in the way of Congressional appropriations and is today struggling along at half-throttle, so to speak,

with practically no funds save those received from other departments for which specific jobs are done.

Work of great importance to the industry is much delayed already and the outlook for next year is even less hopeful than heretofore—a most discouraging prospect for an earnest band of workers, who, in spite of inadequate pay and an outlook which is enough to take the heart out of most investigators, have stuck to their jobs and accomplished results of great value to the industry.

There is just one remedy for this situation, and if the industry wants the work to go forward at a reasonable rate it must apply that remedy, which is to insist upon Congress furnishing adequate support. If this is left to chance it will not be done. If the industry really wants such support to be given, it can and will take steps to see that it is done.

Automobile manufacturers are among the largest tax payers in the country. A small fraction of 1 per cent of the taxes they pay would support the work in question. A little effort in the way of a call upon, or even a letter to, your Congressman will help. Add to this a committee with determination and authority to speak for the industry before the necessary Government officials.

Comfortable Truck Steering Gears

IT is well known that for the greatest comfort of the driver the steering post of an automobile or truck should have a considerable rake, so that the arms of the driver lie in a natural position while he grips the wheel with his hands. However, in motor trucks the aim of the designer usually is to shorten up the driver's compartment so as to retain as much as possible of the available space for loading purposes, and the steering posts, in consequence, are generally made vertical or nearly vertical, with the wheel almost up to the level of the driver's shoulders. It is hardly necessary to point out that operating a truck with the steering wheel so positioned is very tiring, especially.

One solution of the problem thus outlined consists in breaking the steering shaft some distance below the wheel, giving the upper section of the shaft the desired rake and making the lower section vertical. The two sections of the shaft must be connected by some form of gearing and this can be utilized for obtaining the total gear reduction desired, or an additional set of gears may be located at the bottom of the vertical shaft. The first arrangement is evidently preferable, as the additional set of gears would add to the backlash in the steering gear.

A truck recently placed in production is fitted with a steering gear thus described. There are evidently other possible solutions of the problem, and it would not be surprising, now that a start in this direction has been made, to see more attention being given to this phase of truck design in the future. In the past it seems to have been customary for truck designers to proceed on the theory that the drivers are usually husky fellows and they get paid for the work, so there is no need to go out of one's way to provide them with extra comforts, but it is coming to be recognized that

the less tiring the work the more may be expected of the driver, and, besides, that undue fatigue may prove the cause of accident. Finally, if the conditions of operation are improved a somewhat more desirable class of operators may possibly be attracted.

Interesting if True

A NEW YORK paper printed a dispatch from Paris a few days ago to the effect that a French electrical engineer had invented a device which enabled him to stop in the street, from a distance, any automobile which an observer might point out.

Naturally, these reports have attracted considerable attention, for an invention that would make possible the results described would be of great military value. There is much reason to believe, however, that the reports are as greatly exaggerated as was that of Mark Twain's death, on which he himself had a chance to comment.

It is no doubt somewhat risky to say that a certain thing cannot be done, but one has his opinions. The only known medium through which an effect could be produced on the engine of an automobile or an airplane from a considerable distance would be the magnetic waves of radio transmission.

It is true that the ignition circuits will act as a receiving circuit for radio energy, but the effects which can be produced in these circuits by even a powerful radio sending station are insignificant as compared with the effects produced in them by the spark-generating apparatus.

Taking the secondary circuit of the ignition system, the pressure impulses to which it is subjected are of the order of 5000 volts, and it is hardly conceivable that pressure impulses exceeding one-thousandth of a volt could be induced in such a circuit by magnetic waves from a distant station. Therefore, the ratio of the current-producing force ordinarily active in the ignition circuit to the disturbing force is of the order of millions, and the possibility of interfering with the ignition is very remote.

Effects due to radiant energy usually decrease in intensity as the square of the distance from the source increases. There seems to be some reason for believing that radio effects are not transmitted equally in all directions but follow the surface of the earth more or less, in which case the effect would decrease as the distance increased. However, in a transmission from a sending station on the ground to an airplane the energy would certainly be radiated practically equally in all directions and therefore vary inversely as the square of the distance.

If radio waves could be concentrated in a beam, the same as light waves, for instance, the effect of distance from the source on their intensity could be greatly reduced. The chances of success along this line need not be discussed here, for even if this problem were solved ignition circuits could still be rendered immune from interference by using the insulated return system, the two branches of the circuit being arranged close together, or, still better, concentrically, or twisted together.

GOOD CONDITIONS RULE IN INDUSTRY

CONDITIONS in the automotive industry continue good. The index of raw materials shows a drop, which brings it below the commodity index for the period. Lower prices for pig iron and rubber are the chief factors of change in this respect.

Motor stocks are in a somewhat improved situation in comparison with general industrial stocks and the production volume is very satisfactory.

Sales are showing the expected falling off from previous months, but they are generally better than a year ago, although they do not hold up to the percentage of advance over last year, shown by the late summer figures.

The summary of conditions shows the strong features as follows:

- (1) Sales of cars generally above last year.
- (2) Better conditions in spring orders.

- (3) Better prospects in rural districts.
- (4) Good stock conditions in retail circles.

The weak features are:

- (1) Larger demand for credit buying.
- (2) Accumulation of used cars.
- (3) Falling off from previous activity.
- (4) Increasing traffic congestion adjacent to the large cities.

The used car situation is mentioned in almost all reports as a deterrent on sales. It is evident that the number of cars taken in trade is greater than the requirements of the immediate used car market. This is resulting in an accumulation of used cars in the hands of retailers and also in lower prices for used cars.

Conditions in chief distributing centers as reported to correspondents of AUTOMOTIVE INDUSTRIES are as follows:

Southern Distributing Centers Report Cars Selling Well

Dallas

DALLAS, TEX., Dec. 4—Retail sales of new automobiles fell off 10 per cent in Texas during November. Dealers declare their business at the beginning of December is from 20 to 40 per cent better than at the same time in 1922.

There is no urging Texas retailers to stock cars. The fact is that in Texas the majority of the dealers are having a hard time getting cars for delivery. Dealers are urging the factories to rush orders rather than the factories urging the dealers to buy.

The dealers in low or medium priced cars in most cases are far behind with orders. In east Texas merchants go to the larger cities and buy a half dozen of these cars, take them to their home town and sell them at from \$20 to \$30 above the regular list price of the local dealer, because the merchant can make deliveries and the dealer cannot.

There is plenty of money in Texas. Farmers are buying cars, and they are paying cash for them. The business in rural districts in November was better than in the cities.

The used car trade was normal. Special sales by many of the dealers moved most of the rebuilt or conditioned stocks, but the used car situation still presents a problem for the retailer of new cars.

Birmingham

BIRMINGHAM, ALA., Dec. 4—Sales of new cars in the Birmingham territory were slightly off in November, as compared with October and about on a par with November, 1922.

The used car situation is worse in Birmingham today than at any time this year. The market during the summer months through September was the best on record, but since then a steady decrease in the used car demand has been evident. Dealers believe it will take an-

other industrial boom in this section to restore the market.

The purchasing power of the farmers of this State will be increased during 1923, due to the fact that approximately 650,000 bales of cotton will be produced in Alabama, and that the average sales price will net the farmers from \$10,000,000 to \$20,000,000 more than it did last year with a total of 813,000 bales marketed.

Baltimore

BALTIMORE, Dec. 4—November brought about a decided improvement in the retail business in this city. The business was far ahead of that done in October and was a big improvement over November, 1922. Dealers are making elaborate plans for Christmas business and look for the month to be unusually good.

The improvement during November was particularly noticeable in the higher priced field. Most reports are to the effect that pressure on the part of the factories to have dealers stock up is no greater than it has been in the past.

Although business has improved on new cars the situation in regard to used cars remains unchanged.

Louisville

LOUISVILLE, KY., Dec. 4—Confidence is returning to Louisville dealers as the result of improved business during November, compared with October. Sales showed an actual increase, which, considering the nearer approach to winter, is an especially encouraging fact.

Used car sales have slumped to the point where there is very little turnover. November business in this brand, was less than that in October.

Louisville dealers apparently are not being crowded by the factories.

Atlanta

ATLANTA, GA., Dec. 4—In spite of the fact that there was an appreciable decline in used car business in the Atlanta territory during November, and a slight decline in open car sales, volume of business as a whole was a little better than October, and showing a slight improvement over November, 1923, due to what is described as an unprecedented demand for closed cars throughout the entire southeastern territory.

Closed car business this fall is undoubtedly the best by far that it has ever been in this section, with a majority of dealers, especially those in the smaller towns and rural communities, unable to fill all orders for immediate delivery.

It is reported that some of the factories are pushing dealers to stock up more than they have, but in only a comparatively few instances.

The used car situation is unsatisfactory, but dealers are looking for improvement after the first of the year. Solution of the used car problem is the principal difficulty confronting the trade in the Southeast right now. The percentage of trade-ins has been increasing steadily for the last few months, and used car stocks are very large. Many dealers are having special sales, closing out used cars at exceptionally low prices.

New car sales would experience considerable stimulus if an avenue of sales for used cars could be found.

St. Louis

ST. LOUIS, Dec. 4—A decided improvement in the automobile sales situation here has been noted during the past two weeks and prospects are favorable for good business during December.

Factories are not trying to load dealers up with a surplus of cars and the distributors are taking only what they need.

(Other conditions on page 1171)

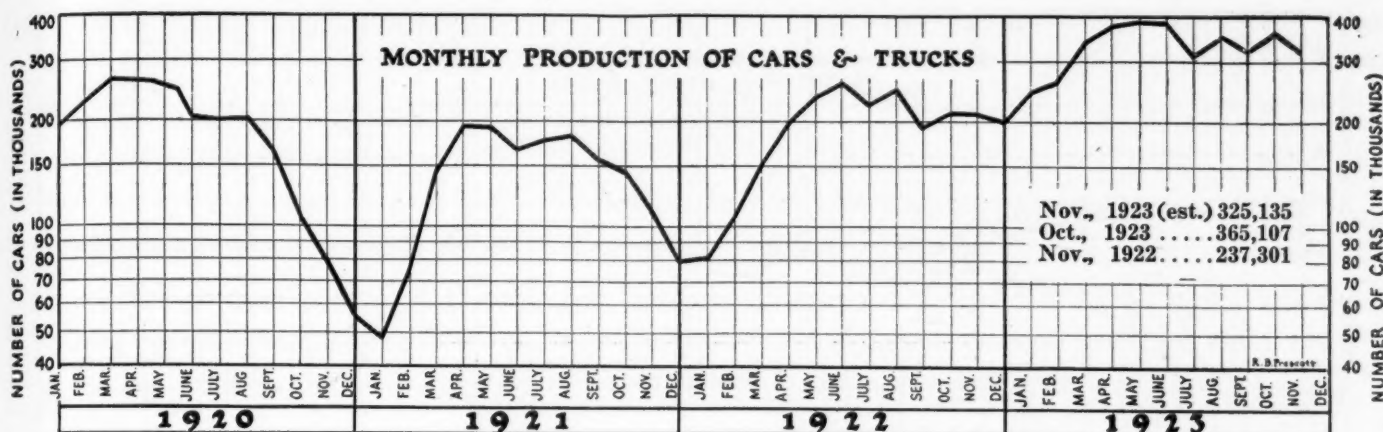
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NOVEMBER OUTPUT PLACED AT 325,135

Falls Below October
But is 37 Per Cent
More Than Year Ago

NEW YORK, Dec. 5—Estimates made by the National Automobile Chamber of Commerce, based on shipping returns, place November production at 325,135 cars and trucks, a decrease of 11 per cent from the October figure, but 37 per cent greater than November, 1922.

That the industry will pass the four-million mark in production this year is more than assured, for with the November count duly recorded, December has to turn out only 277,000 to pass the coveted mark. That this will be comparatively easy is proved by a study of production figures for this year, which show that only once this year—last January, with 243,465—has the industry dropped below what December has to turn out to make the goal.

May Peak Month

Since last March production has been running well above the three hundred thousand mark, reaching the peak in May with 393,861. Therefore it seems a comparatively easy task to put out something like 277,000 cars and trucks this month in order to reach a count that was deemed impossible a year ago.

That November should show a decline from October was expected by those who have been following the monthly reports. One of the largest producers, Chevrolet, slowed down for inventory, while the Ford company itself was something like 20,000 shy of its usual figures. That the industry should hold up to within 10 per cent of October shows

November Output Places Industry Within 277,000 of Reaching
Four Million Production Mark This Year

NEW YORK, Dec. 5—Shipping figures compiled by the National Automobile Chamber of Commerce for November give an estimated production of 325,135 trucks. This is a decrease of 11 per cent from October and is 37 per cent greater than November, 1922. The following table presents the statistics for the first eleven months of this year and for the months of 1922.

	Output		Carloads		Driveaways		Boat	
	1923	1922	1923	1922	1923	1922	1923	1922
January	243,539	91,210	35,228	15,357	30,031	7,479	728	143
February	276,934	122,462	36,165	19,636	43,613	10,173	882	180
March	355,030	172,879	44,983	27,753	62,983	16,917	1,908	560
April	382,695	219,710	46,095	31,334	60,467	21,381	5,027	2,960
May	394,088	256,405	45,339	33,416	62,210	28,827	12,812	7,406
June	378,507	289,224	40,550	34,230	58,761	33,857	13,418	7,737
July	327,993	247,042	32,426	29,116	46,511	28,100	10,049	7,030
August	345,202	274,091	37,770	32,817	50,460	36,768	8,800	10,104
September	327,273	207,028	36,885	25,950	37,400	30,055	8,500	8,002
October	365,107	239,240	41,700	26,980	39,200	33,320	8,000	7,040
November	325,135	237,301	39,850	27,232	29,100	27,376	7,000	5,070

Factory shipments for the other month of 1921 and 1922 and output for 1922 follow:

	Output		Carloads		Driveaways		Boat	
	1922	1921	1922	1921	1922	1921	1922	1921
December	228,252	12,100	26,900	7,500	27,500	134	1,300	

Motor vehicle production segregated as to cars and trucks is as follows:

	1922			1923	
	Cars	Trucks		Cars	Trucks
January	81,696	9,576	January	223,819	19,720
February	109,171	13,350	February	254,773	22,161
March	152,962	20,022	March	319,770	35,260
April	197,224	22,640	April	344,639	38,056
May	232,462	24,097	May	350,410	43,678
June	263,053	26,298	June	337,362	41,145
July	225,086	22,046	July	297,330	30,663
August	249,492	24,692	August	314,373	30,829
September	187,694	19,462	September	298,911	28,362
October	217,566	21,795	October	334,966	30,141
November	215,352	21,949	*November	292,622	32,573
December	208,010	20,354			

* Estimated.

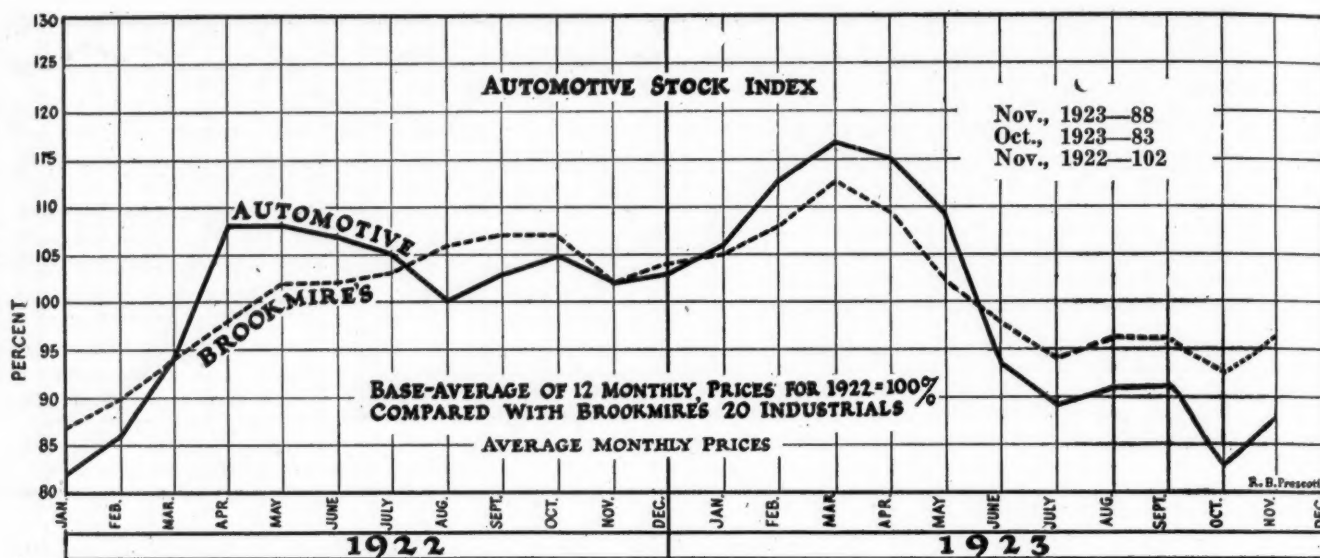
how industrious the others were during the month.

December probably will not beat any production records, although it goes without saying that it will exceed December of a year ago with its 228,375, but it may be expected that it will surpass 300,000. This, however, will but mark a breathing spell in the industry, for in January several of the largest producers are expected to go ahead full steam in an effort to turn out enough cars to en-

able the dealers to stock up for a busy spring.

Several of the largest producers have announced their intention of speeding up in January, with this end in view. General Motors, for instance, has set its mark at 88,000, while Studebaker, Nash and others have indicated that the first month of the year will find them extremely busy. Therefore, it is not at all improbable that most factories will be running at a mid-season pace next month.

UPWARD MOVE IN AUTOMOTIVE STOCKS



New York Exchange

	Oct.2	Nov.5	Dec.4
Ajax Rubber.....	6 1/4	6	7 1/8
American Bosch.....	27 3/4	27	33
American La France.....	11 1/4	11	11 3/8
American La France pfd.....	88		93
Case, J. I.....	29	20	18
Case, J. I. pfd.....	66	66	66
Chandler.....	45 1/8	48	54
Continental Motors.....	6	6 3/8	7
Eaton Axle & Spring.....	20 3/4	23	24 1/2
Electric Storage Battery.....	57	61 1/4	65
Emerson-Brantingham.....	1	1 1/4	3/4
Emerson-Brantingham pfd.....	6 1/2	14	6 1/2
Fisher Body.....	162	158	158
Fisher Body of Ohio.....	96	98	98
Fisk Tire.....	6 3/8	6 3/4	7 1/8
Gardner Motor.....	6 3/4	6 3/4	6 1/2
General Motors.....	13 3/8	14 1/4	13 3/4
General Motors pfd.....	82	79	81 1/2
General Motors 6%.....	82 1/2	80	81 1/2
General Motors 7%.....	97	95	96
Goodrich, B. F.....	21 1/2	19 1/2	22 1/8
Goodrich, B. F. pfd.....	74	75 1/2	74 1/4
Goodyear Tire pfd.....	38 1/4	35 3/4	41
Goodyear Tire pr. pfd.....	90	90	90 3/8
Gray & Davis.....	7	7	7 1/2
Hayes Wheel.....	33 1/2	35	37 1/4
Hendee Mfg.....	16 1/2	17	18 3/8
Hudson.....	22 1/8	24	26 1/4
Hupp.....	16 3/4	17	22 1/2
Inter. Harvester.....	74	75	76 3/4
Inter. Harvester pfd.....	106 1/4	106 1/4	105 3/4
Kelly-S Tire.....	23 1/4	24 3/4	31 3/4
Kelly-S Tire 6% pfd.....	70	70	73
Kelly-S Tire 8% pfd.....	80	70	84
Kelsey Wheel.....	81	87	88
Kelsey Wheel pfd.....	95	99 1/2	101
Keystone Tire.....	2 3/4	2 1/8	3
Lee Rubber.....	16 3/4	13	14
Mack Truck.....	73 1/4	75 3/8	84
Mack Truck 1st pfd.....	92	85	93 1/2
Mack Truck 2nd pfd.....	85 1/2	82	87
Marlin-Rockwell.....	7	3	6
Martin-Parry.....	26	28 3/4	30 3/4
Maxwell Motors A.....	37 3/4	42 1/4	47
Maxwell Motors B.....	10 3/8	12 3/8	12 3/4
Moon Motors.....	23	21 3/8	25 1/4
Mullins Body.....	13	14	13 1/2
Mullins Body pfd.....	89		89
Nash Motors.....	85	86	90
Nash Motors pfd. A.....	97	96 1/2	97 1/2
Ohio Body & Blower.....	2 3/4	2	1 1/2
Packard.....	12 3/8	11 3/8	12
Packard pfd.....	89 1/4	93	91 1/2
Parish & Bingham.....	9 1/4	10	11 1/2
Pierce-Arrow.....	7 3/8	8	8 3/4

Pierce-Arrow pfd.....	17 1/2	19 1/2	24
Pierce-Arrow pr. pfd.....	60	60	63 3/4
Reynolds Spring.....	20 3/4	19	24
Spicer Mfg.....	13 1/2	13 1/2	14
Spicer Mfg. pfd.....	89	88	85
Stewart-Warner.....	77 3/4	92 3/8	88 3/8
Stromberg Carburetor.....	63	67 1/2	85
Studebaker.....	94 1/4	101 1/8	104
Studebaker pfd.....	115	117	115
Timken Roller Bearing.....	34 3/4	35 1/8	37 1/4
U. S. Rubber.....	37 3/8	35	38 1/2
U. S. Rubber 1st pfd.....	91	86	89 1/2
White Motor.....	46 3/4	49	51 1/2
Willys-Overland.....	5 7/8	7 1/8	7 3/8
Willys-Overland pfd.....	58 3/8	73 1/2	71 1/2
Wright Aero.....	9 3/8	10 3/4	12 3/8

Detroit

	Oct.2	Nov.5	Dec.4
Auto Body.....	1		
Bower Roller Bearing.....	8 1/2		
Continental Motors.....	6 1/8	6 1/2	7 1/8
Columbia Motors.....	1 1/8		
Edmunds & Jones.....	35	35	
Federal Truck.....	23	19	
Ford of Canada.....	414	403	392
Hayes Mfg.....	1 1/2	1 1/8	
Hoover Steel Ball.....	11	10	
Motor Products.....	138	154 1/2	165
Motor Wheel.....	9	10	
Packard com.....	12 3/8	10 7/8	12 1/8
Packard pfd.....	92 1/2	91 1/2	
Paige.....	19 1/4	18 3/8	22 3/8
Reo.....	16 1/8	16 3/8	17 3/8
Timken-D Axle com.....	6	6 3/8	7 1/4
Timken-D Axle pfd.....	80		

Chicago

	Oct.2	Nov.5	Dec.4
Bassick-Alemite.....	23	32 3/4	36 1/4
Borg & Beck.....	27		26 1/2
Chicago Coach.....	165	180	
Chicago Coach pfd.....	90	90	90 1/4
Continental Motors.....	6 1/2	6 1/2	7 1/8
Earl Motors.....	1 1/8		
Eaton Axle & Spring.....	22		
Gill Mfg.....	17	18	18 1/2
Hayes Wheel.....			38 1/8
Hupp.....	18	17	22 3/4
McQuay-Norris.....	21		19 3/4
McCord.....	32 1/2		33
Reo.....	16 1/4	16 3/8	17 3/8
Reynolds Spring.....		25	
Stewart-Warner.....	79 1/2	78 3/4	88 1/2
Yellow Mfg.....	268	93	96 1/2

Philadelphia

	Oct.2	Nov.5	Dec.4
Electric Storage Battery.....	58 1/2	61 1/2	65 1/2

Cleveland

	Oct.2	Nov.5	Dec.4
Eaton Axle & Spring.....	21 1/8	22	24
Firestone.....	65	63 1/2	65
Firestone 6% pfd.....	85	85 1/4	92
Firestone 7% pfd.....			90 1/2
Goodrich pfd.....	77 1/2		
Goodyear.....	10	8 3/8	9 3/8
Goodyear pfd.....	38	35 1/2	40
Jordan pfd.....	200	200	260
McGraw Tire.....	3 1/8	1 1/8	1 1/8
McGraw Tire pfd.....		3 1/8	3 1/8
Miller Rubber.....	65 1/2		66
Miller Rubber pfd.....	97 1/2	88	89
Peerless Motors.....	34	27 3/4	29
Sparks-Withington.....	23	20	23
Stearns, F. B.....	18	17	19 1/2

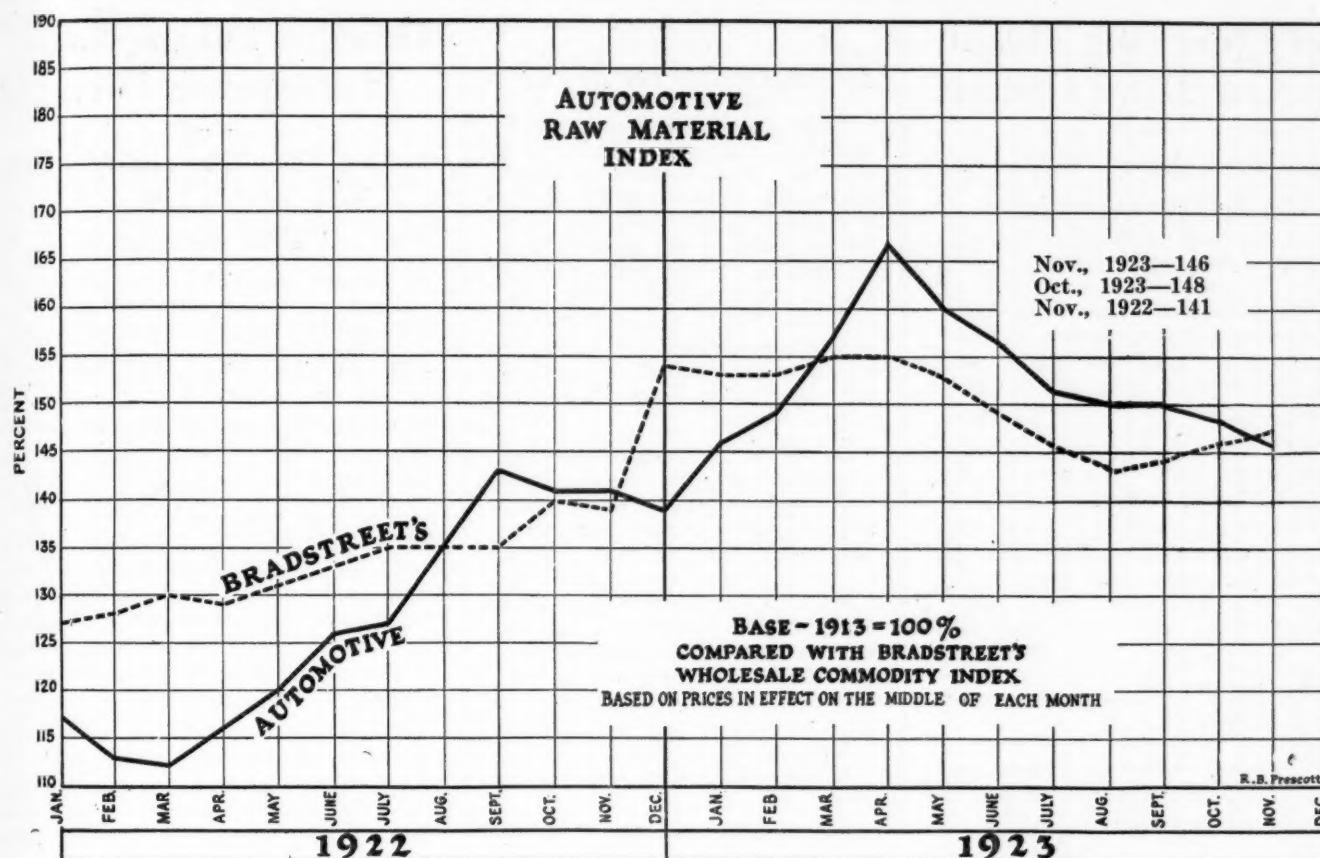
Boston

	Oct.2	Nov.5	Dec.4
Gray & Davis.....		7	7 1/2
Greenfield Tap & Die.....			15
Hood Rubber.....		55 1/4	53
Parish & Bingham.....			12
Simms Magneto.....			1/2

New York Curb

	Oct.2	Nov.5	Dec.4
Aluminum Manufactures.....		23	25
Cleveland Motors.....	25	22 1/2	21
Cleveland Motors pfd.....		85	
Dort.....		23 3/8	2 1/8
Du Pont Motor.....		4	3
Durant Motors.....	29 1/4	29 3/4	25
Durant Motors of Ind.....	7 1/2	8 1/4	7 1/8
Firestone Tire.....			
Ford of Canada.....		395	391
Goodyear Tire.....	10 1/8	8 3/8	9
Hudson.....			24
Kelsey Motor.....			1 1/2
Motor Products.....		23	38
Motor Products pfd.....		42 1/2	44 1/2
Motor Wheel.....	9 1/2	8 1/2	9 1/2
National Motors.....			
Paige-Detroit.....		19	
Peerless Motors.....	30	27	28
Perfection Tire & Rubber.....		70	
Reo.....	16	16 3/8	17 3/8
Roamer Motor.....			5
Stutz.....	11	10 3/4	9
Timken-D Axle.....	6 1/2	6 1/4	7
Willys Corp. 1st pfd.....	4	3	5 1/8

MATERIAL COSTS TAKE FURTHER DROP



Optimistic Tone Reported in Western Farm Sections

Des Moines

DES MOINES, IOWA, Dec. 4—A survey of the leading dealers of Des Moines reflects that November showed a 25 per cent falling off in business in this territory as compared with October. This decrease, however, leaves no food for the pessimist, for November was a considerably better month than November of last year.

Of the cars sold in November, about 85 per cent were sold on time payments. Dealers report that financing for this business is entirely adequate.

The outlook for winter business is good, and dealers are expecting a better winter business than they experienced last year. Dealers are fairly well cleaned out of new cars, although some are overstocked on used cars. The used car situation, however, is reported as fairly satisfactory.

Minneapolis

MINNEAPOLIS, Dec. 4—Speaking generally of the automobile sales situation, the tone is optimistic. While sales do not vary much from last year, the general clearing up of the agricultural situation has brightened the outlook. It is discovered through various surveys that the Northwestern farmer is not so

badly off as reported, that wheat production in Minnesota is, after all, only an insignificant percentage of total production revenue.

November sales are some improvement over October, and the three months of 1923, ending with Oct. 31, are practically the same in business figures as the same months for 1922.

Forced stocking of cars by manufacturers is not taking well wherever it is practised. Although the general tone in new car sales is better, the used car situation is very bad.

Cleveland

CLEVELAND, Dec. 4—Business with automobile retail dealers in this city was about 40 per cent better in November of the present year, than it was in the same month a year ago.

In the county clerk's office where all bills of sale for the transfer of titles to automobiles must be filed, the filing fees for November, 1923, are 40 per cent in excess of the amount that was taken in during the corresponding months of 1922.

During November, 1923, there were 9008 bills of sale recorded, including both new and used cars, while in the same month last year the total was 6251.

Columbus

COLUMBUS, OHIO, Dec. 4—The month of November on the whole was fairly good in sales of automobiles. Buying was up to the records of previous Novembers and with some dealers considerably above them.

As compared with previous months of the present year sales showed the falling off that was to be expected. The decline, however, is not as great as usual.

Demand is running largely for cars selling from \$800 to \$1,800, while there is a fairly steady demand for models of higher price. Closed jobs form from 75 to 80 per cent of the demand.

Farming sections are not absorbing cars to any extent as the selling season in rural sections is past. But farmers as a rule are more optimistic and it is believed that agricultural communities will afford an outlet for cars early in the spring.

Factories as a rule are not pushing dealers to take cars.

The used car situation is not especially good. A campaign among certain dealers to clean up these stocks is bringing results. Prices are being shaded in many cases to move used cars.

(Conditions in other cities on pages 1182 and 1183)

PLANTS FOLLOW NOVEMBER SCHEDULES

Short Working Month to Cut Total Output

Preparations Being Made for Capacity Operations After First of Year

DETROIT, Dec. 4—Production during December is expected to maintain a pace very close to that of November, although figures will be somewhat reduced owing to the Christmas holidays and the general slowing up of operations at that time due to inventory taking or factory overhauling.

In the working days of the month, however, high totals will continue to rule, with some factories showing increases over the last few months. There will be a gradual straightening away in all factories during the month in preparation for a swing into capacity operation with the turn of the year.

Most factories which have been inactive for some time, owing to setting up for new production, will get going on their new models during the month, but will not get into capacity operation until after Jan. 1.

Deliveries are now going forward to dealers on new models and efforts will be made to have all dealers carry stocks for the start of show buying.

Behind on Deliveries

Sales volume throughout the country continues high, due in a large extent to the fact that factories are in a better position to supply closed models than ever before. Makers with popular closed models declare themselves behind on deliveries and expect this condition to continue for some time. This is especially true in the low and medium-priced lines. Used cars are being moved, although in some cases at a loss, but the general used car situation is reported improved.

Ford production in November will approximate 170,000 and December operations will continue at that rate, although several days will be lost owing to the holiday season and inventory taking. Tudor sedan output is now about 650 daily; Ford sedan about 500 and coupe about 1700. This leaves open models forming the bulk of the output.

Chevrolet during November reached daily high totals in excess of 2800, and will continue at much this rate during December except for the holidays. Manufacture of Star cars at the Durant plant in Lansing is increasing as the factory gets tuned up for output on the new models. This is expected to reach 400 daily soon after Jan. 1.

Business in Brief

NEW YORK, Dec. 3—No change in trade or industrial conditions is reported. They continue irregular, but on the whole may be said to be fair to good. November, it is thought, will not be quite as good as October, but the outlook immediately after the first of the year is of a more cheerful nature. Weather conditions and bad roads have had their effect on retailing, but the holiday trade promises a record volume.

Cotton shows strong, with prices the highest they have been in three years, but, on the other hand, hogs are lower in price now than at any time in the past eight years. Wheat and corn have dropped slightly, although Canadian wheat is meeting with a brisk demand in Europe. The low wheat prices have had their effect in Kansas, where, it is stated there has been a decrease of 15.76 per cent in winter wheat acreage, brought about by low prices and the high cost of labor and machinery.

Considerable activity is being shown in iron and steel, and the heaviest buying of the year is reported, with prices of foundry iron up from \$1 to \$2 a ton. Steel, however, is being bought only for immediate needs outside of the railroads.

Bank clearings dropped 22.8 per cent for the week ending Nov. 29, the aggregate reported being \$6,115,461,000. Compared with the same week a year ago, there has been an increase of 12.9 per cent.

Activity was shown in the stock market, with rails higher, bonds irregular, money steady and foreign exchanges lower.

Gray production during the month will be somewhat limited owing to factory changes, but will get into full stride with the show openings. Dodge Brothers will increase its output during December to approximately 600 daily. Buick held close to the 900 daily record of October, and will continue at capacity in December. Studebaker will increase its output during December and will swing into heavy production toward the end of the month.

Hudson-Essex is getting back into heavy production this month and will work toward an approximate output of 400 daily. Paige-Jewett is transferring its Jewett operations to its new plant and operation will be low while changes

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Dealers Taking Cars for Spring Demand

Evident That They and Producers Wish to Forestall a Possible Shortage

NEW YORK, Dec. 3—The increased movement of automobiles from factories to dealers this month reflects the desire of producers and retailers to forestall any car shortage in the spring, when a heavy buying period is anticipated. Production of cars for stocking purposes as well as to meet current requirements will keep plant activity at a satisfactory level in December, with promise of a return to high operating schedules following the opening of the new year.

Further slackening in sales and production is to be expected this month, due to normal conditions, but the aggregate output will be considerably greater than that of a year ago. The period of relative quiet through which the industry is passing is seeing plant schedules maintained at a much higher figure than was the case in the same period last year, and sales are continuing good despite a year of unusual selling records.

Readjusting Plant Facilities

More manufacturers will avail themselves of a comparatively slow month in sales to readjust plant facilities and take inventory. This will result in the curtailment of operations, bringing down the total output from the November figure. The holiday season, also, will be a factor in the reduced totals.

A greater number of shows are being held throughout the country, and each serves as a barometer of the public attitude toward automobiles in its community. Reports from territories where shows have been staged within the last few weeks indicate that buying interest is strong, though the full effects of these shows will not be felt until the first of next year. The show season will start in earnest with the opening of the New York exhibit the early part of January.

Lightened activity in the car-producing field is affecting other branches of the industry. While parts makers are following somewhat reduced schedules, their operations do not show

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Says Erskine Started Bidding for Maxwell

Director James G. Brady Tells of His Negotiations with Studebaker Corp.

NEW YORK, Dec. 6—That negotiations were on between the Studebaker Corp. and the Maxwell Motor Corp. looking to the purchase of control of the latter by the South Bend organization is not denied now. The deal, however, is said to be definitely off.

On the heels of the two meetings of the directors of the companies in New York last week, there has been started a controversy as to which side opened the negotiations. From Boston came a statement to the effect that Maxwell was the one to make the preliminary offer. This is replied to today by James G. Brady, a Maxwell director and brother of Nicholas Brady, who asserts that President A. R. Erskine of Studebaker assumed the initiative in the deal and that a price for Maxwell control had been agreed upon by President Erskine and one Studebaker director, and Walter P. Chrysler and Brady himself representing Maxwell.

Director Brady's Statement

In his statement, J. G. Brady also said:

The facts are, such a merger was in contemplation, but the approach came solely from the Studebaker Corp., whose president, Mr. Erskine, came to see me with one of his directors and expressed their interest in acquiring control of the Maxwell Motor Corp., subject to the verification of the plant, equipment, etc., of Maxwell and subject to the approval of the Studebaker board of directors.

Toward this end negotiations were carried on between Mr. Chrysler and myself, representing Maxwell, and President Erskine and his director, and a price to be paid for the Maxwell company agreed upon, which Mr. Chrysler and myself were prepared to recommend to the Maxwell board of directors and at which we would have been willing to sell our Maxwell holdings, with the understanding that all other Maxwell stockholders should have the same opportunity.

After a meeting of the Studebaker board, but before any meeting of the directors of the Maxwell Motor Corp., we were advised by the president of the Studebaker Corp. that, because his own board of directors failed to agree, further consideration of such a merger must be abandoned. Who was responsible for the publication of the fact that a merger had been suggested I do not know. I do know, and beg to state, that neither ourselves nor the interests we represent sold any of our holdings or benefited in any way whatsoever from the increases which took place in the market value of the Maxwell stocks pending this rumor.

Wilson Out of Maxwell

DETROIT, Dec. 5—Following the falling through of the negotiations between Studebaker and Maxwell, Detroit was surprised by the announcement late last week of the resignation of William R. Wilson as president of the Maxwell Mo-

TAXES FROM INDUSTRY DECLINED LAST MONTH

WASHINGTON, Dec. 5—A decrease of \$2,982,249 in taxes collected on automobiles, motorcycles and accessories in October of this year, compared with October of 1922, is shown in the monthly summary of the Bureau of Internal Revenue.

The Government collected from the automotive industry in October of this year a total of \$12,975,036, compared with \$15,957,286 in October, 1922. On automobile trucks the October, 1923, tax was \$1,002,580, as against \$890,937 in October, 1922. On passenger cars and motorcycles in October, 1923, the excise tax was \$8,358,900, contrasted to \$11,587,133 in October, last year. A total of \$3,613,556 was collected on accessories and parts during October, 1923, compared with \$3,479,215 in October last year.

While the collected tax in October of this year shows a considerable decrease over last, for the ten months' period of January to October, the 1923 tax collected from the automotive industry exceeds by \$4,268,795 the tax collected for the first ten months of last year, when it was \$48,674,609.

tor Corp. It is denied, however, that the Studebaker matter had anything to do with the retirement of Wilson, it being asserted that the resignation had been contemplated for several months.

Wilson was selected to head Maxwell on the reorganization of the company by Chrysler about three years ago. His incumbency was generally regarded as highly successful, as under his direction Maxwell has cleared off practically all of its indebtedness and was preparing for large production in 1924.

Previous to joining Maxwell he was a vice-president of the Irving National Bank, New York, and before that he was an executive of Dodge Brothers under the régime of John and Horace Dodge.

Erskine Makes Statement

SOUTH BEND, IND., Dec. 6—A. R. Erskine, president of the Studebaker Corp., does not deny that his company took the initial step in the negotiations with the Maxwell company. After reading the Brady statement, he confirmed the facts as Brady stated them, adding that "the initial approach was made by us, but no commitments were reached at any time by either side."

ROY CHAPIN ILL

DETROIT, Dec. 6—Roy D. Chapin, chairman of the board of directors of the Hudson Motor Car Co., is in a local hospital for an operation for appendicitis, which will be performed today.

Dorris Stockholders Vote for Dissolution

Formation of New Company Regarded as Best Means Toward Reestablishment

ST. LOUIS, Dec. 4—Stockholders of the Dorris Motor Car Co. in a meeting today decided on a voluntary dissolution of the company in the hope that a better plan of procedure may be found in the formation of a new company.

It is the plan of the officers and directors of the company to continue the business much the same as heretofore, and in due time to dispose of enough assets of the company to eliminate the preferred stock from the company's books. Satisfactory arrangements have been made with the owner of the preferred stock for the retirement of his holdings.

Directors in Charge

That the value of the assets of the company is realized is shown by the eagerness of outside interests to buy whatever the company wishes to dispose of. The board of directors, through the voluntary dissolution, will be in charge of the assets of the company, and all concerned are anxious to see the business continued in this city if the necessary funds are forthcoming.

About 1500 Dorris cars and trucks are in use in St. Louis, and several thousand are in service in other parts of the United States and abroad. The service department of the company, with parts valued at \$200,000, will be continued.

The assets of the company have been appraised by an auditing company at \$800,000, including the value of equipment and deducting large reserves, with liabilities consisting of unpaid accounts of \$55,000. The outstanding preferred stock amounts to \$100,000 and common stock \$716,000.

Fisher Body Co. Expands Glass Plant Subsidiary

DETROIT, Dec. 5—The Fisher Body Co. will build new glass plants at its present factories at Blairsville, Pa., and Ottawa, Ill., for its subsidiary, the National Plate Glass Co., at a total cost of \$10,000,000. With the additional output that the new factories will make available, the Fisher company estimates that it will have ample supply for all its body manufacturing requirements. The plant at Blairsville will be entirely rebuilt and probably will be in operation by Aug. 1. The Ottawa plant will take longer in construction and probably will not get in operation until toward the end of the year.

The National Plate Glass Co., organized in March, 1920, represents a combination of the Saginaw Plate Glass Co., Saginaw Columbia Plate Glass Co., Blairsville, and the Federal Plate Glass Co., Ottawa.

3 Creditors Petition Long Bankruptcy

Charge Preferential Payments Were Made When Company Was Insolvent

BOSTON, Dec. 3.—An involuntary petition in bankruptcy has been filed in the United States district court against the R. H. Long Co. The petitioners are three creditors with small claims, who charge preferential payments last November, when, they allege, the company was insolvent.

Two Committees Were Named

BOSTON, Dec. 1.—Following a meeting held at one of the larger banking houses here a few days ago, plans were made for handling the affairs of the R. H. Long Motors Co., the R. H. Long Co. and the R. H. Long Shoe Co., all of Framingham, through two committees.

One is composed of Wilbur W. Higgins of the Old Colony Trust Co., George E. Pierce of the National Shawmut Bank, both of Boston, and John W. Bargefrede of the First National Bank, Brooklyn, N. Y., to act for the secured creditors. The other is made up of G. L. Margeson, B. F. Goodrich Co.; T. M. Regan, the American Credit Indemnity Co. of Boston, and one other to be selected later to look after the unsecured creditors.

The appointment of these committees is the aftermath of meetings held during the last few days by Robert M. Falkenau of the Irving Bank-Columbia Trust Co., Brooklyn, N. Y., and W. W. Shepard of the Worcester Bank & Trust Co. and Higgins, Pierce & Regan.

The business has been turned over to the Caswell & Woods Associates, industrial engineers, as a result of "lack of liquid working capital and a consequent inability on the part of the companies to meet their current liabilities." According to the report of the committee of investigation, Caswell & Woods estimates the assets of the three companies at about \$1,875,000 and the direct liabilities as about \$1,200,000 and their contingent liabilities at approximately \$800,000.

Builds "Bay State" Car

The principal business of the Long companies is the building of automobiles known as the Bay State. This work was undertaken several years ago when the R. H. Long Co. had completed its Government work. Long previously had done some body building for automobile making concerns. He sent to Cleveland and secured a designer formerly with Winton, and the Bay State was placed on the market, its closed models—the first produced—selling at \$2,500.

Salesrooms were opened in Boston and other cities, and a plant was secured at Worcester in addition to the one at Framingham. Long has not operated the shoe plant since Sept. 1, last. He and his family practically control the

shares of stock of all three companies.

The creditors' committee is optimistic over the possibilities of straightening out the difficulties. In its report it says:

The R. H. Long Co. is the parent company. Substantially all the stock is owned by Richard H. Long and members of the Long family. The R. H. Long Motors Co. owns the principal manufacturing plant at Framingham, the Worcester factory erected last year, the inventory of the finished Bay State automobiles and materials for their manufacture, and the equipment contained in the plant at Framingham.

The R. H. Long Shoe Co. owns the inventory, machinery and accounts appertaining to the manufacture of shoes. The R. H. Long Co. owns the stock of the two subsidiary companies, a considerable amount of land in Framingham, upon which are located a large wooden shoe factory, several brick buildings for the manufacture of shoe machinery and certain dwelling houses and farm buildings, together with inventory which includes war materials believed to have substantial value.

It did own a large tract of land adjacent to the new factory building in Worcester. This land has been transferred to R. H. Long as trustee for the R. H. Long Company.

The principal business of the companies today is the manufacture of automobiles. The R. H. Long Motors Co. does the manufacturing and the R. H. Long Co. the selling. The R. H. Long Shoe Co. has not been operated since Sept. 1, 1923. Its inventory has been substantially liquidated."

Government Claims Pending

The assets and liabilities figures listed do not include, the report states, "claims of the R. H. Long Co. against the United States on account of war contracts or claims of the Government against the R. H. Long Co. for additional income and war profits taxes. Even a rough estimate of these claims cannot be made without a more careful study than available time has afforded.

"A field audit by a representative of the Bureau of Internal Revenue suggests an additional tax liability of possibly \$1,400,000. Mr. Long, however, expresses the belief that additional taxes, if any, will be very small. The tax situation, however, calls for immediate and careful study."

The report quotes Caswell & Woods with saying:

With the advance of the comparatively small amount of cash necessary to finance the liquidation of the companies' inventories and, with careful supervision over such liquidation by representatives of the creditors, creditors may more reasonably expect to receive substantially full payment of their claims than would be the case if court proceedings should now intervene and compel an immediate conversion of assets into cash at a forced sale.

They have also advised your committee that in their opinion the appointment of a receiver at the present time would jeopardize the chances of satisfactorily disposing of the tax situation.

COUPE DE LUXE BANKRUPT

ST. LOUIS, Dec. 3.—A voluntary petition in bankruptcy has been filed by the Coupé De Luxe Body Co., with liabilities placed at \$150,026 and assets at \$107,250. The company has been manufacturing bodies for Ford coupés.

Ruling Aids Winther's Unsecured Creditors

Referee Refuses to Validate Claim Arising Out of a Note Held by Bank

KENOSHA, WIS., Dec. 3.—Unsecured creditors of the defunct Winther Motors, Inc., have been given a ray of hope that they will share in the proceeds of liquidation by an important decision of the referee in bankruptcy, Milton Knoblock, of Racine, Wis.

This decision holds that a claim of \$30,000 arising out of a note held by the First Wisconsin National Bank, of Milwaukee, is not a valid claim against the bankrupt, and that a claim of Martin P. Winther and William Hinrichs to certain machinery and personal property, arising out of this transaction, be set aside.

Action Hinged on Note

The ruling hinged on a most interesting point of law and is of interest not alone in this case but in other bankruptcy proceedings. The note for \$30,000 in question was given by the Winther Motors, Inc., and when it was unpaid at maturity, renewal was refused by the bank unless it was endorsed.

Winther, president, and Hinrichs, treasurer of the Winther company, indorsed the note. In turn, the company attempted to secure the indorsement by delivering to the indorsing officers a document purporting to be a chattel mortgage on certain motor trucks, which, however, were left in the custody of the company.

Later the company purchased \$95,000 of machinery from the La Crosse Tractor Co., and a transaction was authorized by the company, whereby the mortgage and indorsement for the note in question were to be secured by a claim against this machinery, and the trucks were released as security.

This transaction, authorizing the substitution of the interest in the machinery in place of the trucks, the latter having been sold and the cash realized given to the company, was the deal involved in the ruling. This holds that the bank must look for the collection of the note to the indorsers rather than to the now bankrupt company.

Machinery Substitution Invalid

The substitution of machinery for trucks is held invalid because it was never properly recorded or notice given the interested parties. The referee found the machinery in question in one of the unfinished buildings of the bankrupt concern, without identification that the ownership was partly vested in Winther and Hinrichs. In other instances where machinery held by other persons than the company as collateral was properly tagged, so that interested persons might be apprised of the fact, the referee holds claims valid.

Ford Starts Making Lamps at Flat Rock

Schedule at Beginning Is 1000 Sets Daily—Future Operations Indefinite

DETROIT, Dec. 4—Considerable excess capacity in the lamp division of the automotive industry is promised for a period at least by the inauguration of lamp manufacture by the Ford Motor Co. at its Flat Rock, Mich., plant. This plant, originally designed for the manufacture of plate glass, but since abandoned for this purpose, will build approximately 40 per cent of all lamps used in Ford cars.

The entire Ford lamp supply up to this time has been built by two manufacturers, Edmunds & Jones, Detroit, and the J. W. Brown Manufacturing Co., Columbus. As Ford manufacture gradually mounts to the 10,000 daily mark in 1924, lamp production at Flat Rock will grow until it is building for about 4000 of these units, leaving 6000 sets daily for the outside manufacturers.

Under operating schedules of Ford Motor Co. during the present year lamp manufacturers have been building for upward of 7000 daily production, in recent months for an approximate daily schedule of 7500. With the Flat Rock plant starting off on a schedule of 1000 lamp sets daily, this leaves lamp suppliers with an excess capacity of this much at the start.

At the Ford offices it is declared that the Flat Rock lamp operations are still in the experimental stages and that nothing definite can be said about the final lamp production though it may go beyond the 40 per cent total and may be less. Lamp production will vary during the period that experiments are carried out, and until it is placed on a definite basis the company will not consider it in a production sense in estimating requirements.

A. P. I. Meeting to Hear Speakers from Industry

NEW YORK, Dec. 5—According to announcement made by the American Petroleum Institute, the following men, all of whom are well known in the automotive industry, will speak at the annual meeting of that organization, to be held in St. Louis, Dec. 11, 12 and 13: Charles F. Kettering, Thomas Midgley, Jr., both of the General Motors Research Corp.; H. L. Horning, Waukesha Motor Co., representing the Society of Automotive Engineers, and Dr. G. K. Burgess and W. S. James of the Bureau of Standards.

Burgess will outline the progress made in the cooperative fuel tests conducted at the Bureau with the cooperation of the A. P. I., S. A. E. and N. A. C. C. He is scheduled to speak at the morning session, Dec. 12. James and Midgley are

on the program for the afternoon session of the same day and are expected to speak respectively on service tests of lubricants in automotive engines and progress in anti-knock fuels.

Kettering is to be one of three speakers at the annual dinner on the evening of Dec. 13, the others being Julius H. Barnes, president of the United States Chamber of Commerce, and A. C. Bedford, chairman of the board, Standard Oil Co. of New Jersey.

Spring Maker Refunds Tax to Distributors

DETROIT, Dec. 5—The Detroit Steel Products Co. has refunded to automotive distributors handling Detroit springs the 5 per cent excise tax levied on replacement springs by the Government during the war. This is made possible by a claim filed by the company against the Government a year ago and recently allowed, which was based on a ruling by the Internal Revenue Department in September, 1922.

This ruling refers to the fact that a tax of 5 per cent was imposed on parts for automobiles. It then defines an automobile part and states that leaf springs were in use a great many years before the advent of the automobile and are used for many purposes other than automobiles.

The ruling concludes with the decision that "vehicle leaf springs as distinguished from highly specialized leaf springs, such as auxiliary shock-absorbing devices using the leaf spring principle, which are not primarily adapted only for use as a component part of an automobile or motorcycle, are not subject to tax under Section 900 of the Revenue Acts of 1918 or 1919.

Overland Preparing Way for Preferred Dividends

TOLEDO, Dec. 3—Word sent to the New York Stock Exchange that the Willys-Overland Co. contemplated reduction in the par value of its common stock from \$25 to \$5 is regarded here as being preliminary to a resumption of preferred dividends.

"The purpose in the change of the par value of the stock," declared Thomas Tracy, attorney and director of the company, "is to reduce the capital stock to correspond with the book value, in order that dividends may be resumed on the preferred stock."

With a total deficit of about \$33,000,000 on the books of the company, reduction in the par value from \$75,000,000 to \$15,000,000 will change that deficit to a surplus of \$11,000,000 by a bookkeeping transaction not affecting the number of shares of property of the company.

FORD OUTPUT FOR WEEK

DETROIT, Dec. 1—Ford Motor Co. production in the week ending Nov. 27 totaled 40,809 cars and trucks for domestic sale. Tractor production during the week was 1720 and Lincoln 154.

Ford Will Construct New Plant in Denmark

Will Be Completed by Spring—Copenhagen Company Serves Three Countries

DETROIT, Dec. 5—Ford Motor Co. will complete by spring a new assembly factory at Copenhagen, Denmark, which is declared will be one of the finest in Europe, introducing new standards of design and operation. The site covers four and a half acres on the South Harbor, with docking facilities on two sides, permitting direct delivery of assembly material from the Manchester plant and from Detroit via New York.

The growth of the business of the Copenhagen plant since its opening in June, 1919, is declared remarkable, and it now ranks as the second largest foreign company, Manchester being first. Demand for Ford cars is in the three Scandinavian countries directly served by the plant during the present year has been particularly good, the company declares.

A total of thirteen countries are served from Copenhagen, these being Denmark, Iceland, Faroe Islands, Sweden, Norway, Finland, Free State of Danzig, Esthonia, Latvia, Lithuania, Poland, Ukraine and Germany.

The new building will be 400 feet long by 300 wide. The outer section is two stories high, with an inner court of one story with daylight roof. All stock will be moved on conveyors. The second floor will be devoted to an exclusive body-making factory. The assembly line will be on the continuous production system. A large power plant adjoins the main building. The new plan and property represents an investment of more than \$650,000.

Ford Company Produces Nearly Half Total Output

DETROIT, Dec. 4—Comparison of automobile production figures issued by the Department of Commerce with Ford Motor Co. figures gives the latter approximately 49 per cent of all passenger cars and trucks built in the United States in the first ten months, according to a company statement.

Car and truck figures show a total of 3,396,638 in ten months. Ford figures for the same period, including as do those of other companies, cars and trucks made here for assembly in foreign countries, are 1,639,374. This total does not include Manchester, England, which manufactures practically all of its own parts, or the Ford Motor Co. of Canada, Ltd., totals, which were 27,606 and 69,452 respectively, for ten months.

A comparison of truck production figures shows 62 per cent Fords, the company declares. Total truck production for this period was 320,285 of which Ford production was 200,996.

Studebaker Reduces Price of Closed Cars

Reductions on Three Different
Chassis Models Range from
\$30 to \$80

SOUTH BEND, IND., Dec. 5—The Studebaker Corp. of America announces price reductions on all closed cars on its three different chassis models, the drop ranging from \$30 to \$80, according to body style.

The old and new prices are as follows:

	Old Price	New Price
LIGHT SIX:		
2-3 Passenger Coupé....	\$1,225	\$1,195
4 Passenger Coupé....	1,475	1,395
5 Passenger Sedan....	1,550	1,485
SPECIAL SIX:		
3-4 Passenger Coupé....	1,975	1,895
5 Passenger Sedan....	2,050	1,985
BIG SIX:		
5 Passenger Coupé....	2,550	2,495
7 Passenger Sedan....	2,750	2,685

Stearns Advances Prices of Its 4-Cylinder Models

CLEVELAND, Dec. 4—The F. B. Stearns Co. has advanced the prices of all models on its four-cylinder Stearns Knight chassis, the increase ranging from \$155 on the open models to \$255 on the closed.

There is no price change at present on the six-cylinder chassis.

The old and new prices are as follows:

	Old Price	New Price
4- Passenger Phaeton....	\$1,595	\$1,750
6- Passenger Phaeton....	1,595	1,750
Sport Coupé.....		1,995
Coupé Brougham.....	1,995	2,195
6- Passenger Sedan.....	2,095	2,350
Sport Sedan.....		2,450

Hudson Increases Price of Three of Its Models

DETROIT, Dec. 1—Hudson Motor Car Co. has increased prices on three models of its Hudson line.

The old and new prices are as follows:

	Old Price	New Price
Speedster	\$1,295	\$1,345
Seven-pass. Phaeton....	1,350	1,425
Coach	1,375	1,475

The sedan price is unchanged at \$1,895. The new prices are effective immediately.

Tire Makers Doubtful of Year-End Increase

AKRON, OHIO, Dec. 3—Rumors received here to the effect that an increase of tire prices is expected around the first of the year, due to the high cost of cotton fabrics and other reasons, have not been confirmed by any of the big companies. Some of the manufacturers admit that Jan. 1 usually is the time when advances are announced, because

of their effect in increasing spring delivery buying. For this reason there may be a slight increase in the near future. It is declared, however, that the advance will be small and executed as a sales argument rather than as a profit-producer.

On the face of the attitude of Harvey S. Firestone, who insists that prices now are stable, the year-end advance may not materialize unless it is known that Firestone will join in such a move.

The Mason advance of 5 per cent to the consumer and 10 per cent to the trade only brought its prices in line with other price lists.

Premier Sedan Price

INDIANAPOLIS, Dec. 5—The price of the new Premier seven-passenger sedan, fitted with a McFarlan body, has been increased from \$3,385 to \$3,585.

Templar to Build Line of Six-Cylinder Cars

CLEVELAND, Dec. 3—The new Templar Motor Car Co. has about completed its plans for 1924. It will place on the market a complete line of six-cylinder cars to sell for less than the retail price of the four-cylinder models, in which the old management had specialized.

The new "six" models will be ready for the New York show. They include phaeton, roadster, coach and sedan.

The new organization is made up of a group of stockholders in the former corporation that purchased the plant when it was sold at receiver's sale.

New Phaeton and Sedan Brought Out by Haynes

KOKOMO, IND., Dec. 4—The Haynes Automobile Co. has rounded out its line of passenger car models on the "60" chassis by adding a special phaeton listing at \$1,395 and a special five-passenger sedan at \$1,945.

The prices of these two models are \$100 above their regular phaeton and sedan jobs.

ITALIAN RACE DATES

WASHINGTON, Dec. 5—The International Automobile Race for the Florio Cup in Italy will be held on April 27, 1924, at Trapani, according to advices transmitted to the automotive division of the United States Department of Commerce. Following the Florio cup races, there will be held on May 4 a speed test of 390 kilometers over the circuit at Trapani, the prize being 50,000 lire in addition to cups and medals.

On May 11 the Misena Cup Race is scheduled at Caltanissetta, Italy, being 332 kilometers, for 25,000 lire.

Balloon Tires on H. C. S.

INDIANAPOLIS, Dec. 5—The H. C. S. Motor Car Co. announces that H. C. S. cars now can be furnished with balloon tire equipment. Either disc or wire wheels can be supplied at an added cost of \$100 to the list prices.

Coast Club Seeking Truck Weight Cut

Californians Start Campaign to
Protect All Paved State and
County Highways

LOS ANGELES, Dec. 3—A definite line of cleavage between the automobile clubs of this State and operators of heavy duty motor trucks has developed as the result of the action of the Automobile Club of Southern California in waging a campaign to establish a low maximum weight limit for trucks in Los Angeles.

Trucks unladen weighing 10,000 pounds or more, in use Sept. 1, 1923, are permitted a gross weight of 24,000 pounds on all paved State and county highways until Dec. 31, 1926. After that the limit is to be 22,000 pounds, which also is the limit for all vehicles which unladen weigh less than 10,000 pounds, regardless of the width of the tires.

Municipalities are permitted to increase the allowable weight limits but not to decrease them. The former State law permitted a gross weight of 30,000 pounds, and the Los Angeles City Council enacted an ordinance establishing the limit at 26,000 pounds. The Automobile Club of Southern California undertook to have this ordinance repealed by the Council and failed.

Thereupon initiative petitions were circulated and a sufficient number of signatures obtained to require the Council to repeal the ordinance or submit the question for a referendum vote. The club employed circulators of the petitions who solicited signatures in office buildings, by house to house canvass and on prominent street corners.

"Sign this petition and save the lives of your children"; "Sign this petition and stop the breaking up of your streets"; "Sign this petition and reduce your taxes"; "Sign this petition and cut down truck loads," were typical expressions used by the solicitors.

Motor Wheel Will Make Best Showing This Year

DETROIT, Dec. 4—The Motor Wheel Corp. will make the biggest showing in its history this year, according to H. F. Harper, president and general manager. Production records show that the company is now producing 4000 complete sets of wood wheels and 1500 sets of disk wheels daily, in addition to other automotive parts. Production in 1924 is expected to exceed 5,000,000 wheels, in addition to parts and accessory business.

Gross sales for the nine months ended Sept. 30 were \$15,706,111. Net sales to customers were \$13,282,028, against net for the same period last year of \$7,863,283. Net operating profit, before tax provision, for the first three-quarters shows \$1,323,886. Gross sales for October approximated \$2,000,000.

Men of the Industry and What They Are Doing

Dodge Promotes John R. Lee

John R. Lee has been appointed assistant to President Fred J. Haynes of Dodge Brothers. He will assume his new duties immediately, and the announcement of a successor as head of Dodge Brothers' interests in Canada will be made later. For the last year Lee has been in charge of Canadian affairs of the company since his withdrawal from the Wills Sainte Claire enterprise. Lee is widely known in the industry. Previous to his connection with the Wills Sainte Claire, he had been high in the councils of Ford Motor Co., and was in charge of welfare work with that company for a long time. With C. Harold Wills he organized the Marysville company, from which he withdrew to join Dodge Brothers.

Don F. Whittaker with Haynes

Don F. Whittaker has resigned as secretary and general manager of Motor Truck Industries, Inc., to become zone sales manager for the Haynes Automobile Co. in the Eastern and Middle West territory. Whittaker's resignation with the truck association will become effective Dec. 31, by which time a successor will have been appointed. Whittaker has been secretary and general manager of the truck association since its formation and also served in the same capacity with the predecessor organization, the National Association of Motor Truck Sales Managers, taking up his work with that body in March, 1921. He was re-elected to the secretaryship at the recent annual meeting of Motor Truck Industries. Before entering the truck association field he served for a number of years as an executive of the Federal Motor Truck Co. and several other truck producing companies. In his work with Haynes, Whittaker will be in charge of the zone comprising Ohio, West Virginia, Virginia, Pennsylvania and part of New York State.

Gorrell Succeeds Moskovics

Col. E. S. Gorrell has been appointed vice-president of the Nordyke & Marmon Co. to succeed Fred E. Moskovics, resigned. Colonel Gorrell entered the employ of the company in 1920 directly after his resignation from regular army service. He is a West Point graduate and at the time of his resignation from the army was serving as chief of staff of the American Expeditionary Forces. He entered the aviation division of the signal corps in 1914. His first work with the company was the creation and management of the sales extension department of the sales division.

Wheeler Takes Brief Trip Abroad

Douglass A. Wheeler, president of the Wheeler Schebler Carburetor Co., has

sailed for Europe for a brief business trip. He expects to return in time for the New York Show.

James D. Mooney Returns Home

James D. Mooney, president of the General Motors Export Co., has returned from a four months' trip which took him virtually around the world. His chief purpose was to get into closer contact with the representatives of his company in the far corners of the globe and he found that they were functioning efficiently at almost every point. Most of his time was spent in the British Empire, including Canada, New Zealand, Australia, India and England, but he also visited Hawaii, France, Holland, Germany and Denmark. American motor vehicles have a long lead over all competitors, Mooney found, except in those countries which manufacture cars and trucks of their own. Mooney found that economic conditions are slowly improving and he is confident the export market will be even better next year than it has been in 1923. Accompanying Mooney on the trip over aboard the Aquitania was Walter Johnson, general manager of General Motors of London, who is making one of his periodic visits to this country.

Changes With Stewart-Warner

Warwick Ray, who has been in charge of sales engineering for the Stewart-Warner Speedometer Corp. in the Detroit territory since Jan. 1, 1919, has been transferred to the general office in Chicago where he will take over general charge of sales engineering. A. R. Kepler, who has been handling sales engineering in territory east of Indiana, will succeed Ray in Detroit. A. I. Johnson, who has been in charge of the specification division of the engineering department at Chicago, will succeed Kepler, with headquarters in Cleveland.

Herr Is Club President

E. M. Herr, president of the Westinghouse Electric & Manufacturing Co., has been elected president of the Electrical Manufacturers Club, which is composed of the higher officials of electrical manufacturing concerns and operates for the purpose of advancing the electrical industry.

Maher Now a Vice-President

George A. Maher, manager of the Kenosha plant of the C. M. Hall Lamp Co., has been made a vice-president of that company. He has been manager of the Kenosha plant since it was taken over by Hall from the former Badger Brass Manufacturing Co. and is widely known in the industry.

Krohn Back From Mexico

Henry Krohn, vice-president in charge of sales of the Paige-Detroit Motor Car

Co., has returned to the factory after a two weeks' trip to Mexico, on which he visited the company's distributor at Mexico City and surveyed the market possibilities for the coming year.

J. L. Bordenave Promoted

J. L. Bordenave has been promoted to production manager of the American Auto Parts Co. George A. Schaefer has been appointed to the position of purchasing agent to fill the vacancy left by Bordenave.

McGuire Made Service Manager

John C. McGuire, formerly assistant service manager of the Dort Motor Car Co., has been promoted to service manager of that company. McGuire has been with Dort for four years.

Dethloff Heads American Nickel

W. L. Dethloff has become president of the American Nickel Corp., which manufactures pure malleable nickel at Clearfield, Pa., and S. J. McCabe has been appointed secretary and treasurer. Dethloff will also continue to serve as general manager. The changes follow the acquiring of control of the corporation by the Mond Nickel Co., Ltd., of London, England.

Birmingham Joins E-B Company

Frank T. Birmingham, for the last three years in charge of purchases of the Samson Tractor Co. at Janesville, Wis., has resigned to accept a similar position with the Emerson-Brantingham Co. at Rockford, Ill.

Morrison in Accounting Work

R. E. Morrison has resigned as vice-president and controller of the United States Motor Truck Co. and will re-enter the accounting field as a member of the firm of Gustetter, Madison & Morrison, Cincinnati, with which he will specialize in cost systems and tax consultation for automotive accounts.

Join Campbell, Trump & Co.

Gordon C. Eldredge and L. Grant Hamilton have become members of the Campbell, Trump & Co. organization in Detroit, and will specialize in automotive accounts. Eldredge was formerly identified with the Green, Fulton, Cunningham Co. and the J. Walter Thompson Co. Hamilton previously was connected with the Federal Motor Truck Co., Green, Fulton, Cunningham Co. and Campbell-Ewald Co.

Hanso Succeeds Watts

Howard C. Hanso has succeeded L. A. Watts as a director of the Republic Rubber Co. of Youngstown, Ohio.

October Showed Fall in Casings Inventory

More Shipments Reported Made
in October Than in Pre-
vious Month

NEW YORK, Dec. 4.—Production of pneumatic casings, inner tubes and solid tires increased in October over September, according to the monthly compilation of statistics of the Rubber Association of America.

In the same month inventory of casings and solid tires declined, but that of inner tubes mounted. Shipments of casings and solid tires increased and those of inner tubes declined.

The following table shows inventory, production and shipments for all of 1922 and for the ten months of this year:

PNEUMATIC CASINGS				
1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	66	4,174,216	2,055,134	1,596,806
February	66	4,691,329	2,084,308	1,562,365
March	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095
August	63	4,629,392	2,905,209	3,029,823
September	64	4,612,037	2,504,744	2,502,106
October	64	4,682,958	2,674,662	2,588,770
November	62	4,964,976	2,733,134	2,379,708
December	59	4,599,208	2,656,942	2,934,079
1923				
January	62	4,695,816	3,127,270	2,994,297
February	60	5,224,387	3,217,987	2,588,639
March	58	5,670,601	3,865,726	3,332,637
April	56	6,088,272	3,539,326	2,976,160
May	57	6,906,594	3,659,986	2,757,764
June	55	7,040,600	2,956,943	2,502,185
July	54	6,471,124	1,992,989	2,539,425
August	58	6,058,387	2,355,915	2,807,432
September	60	5,397,557	2,029,581	2,623,775
October	59	4,876,352	2,361,340	2,819,583

INNER TUBES				
1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	66	5,246,647	2,343,393	2,889,724
February	65	6,141,956	2,596,774	1,702,583
March	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,938,947
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744
August	63	5,207,228	3,808,224	4,220,055
September	64	5,164,757	3,501,442	3,558,971
October	64	5,488,033	3,787,758	3,420,680
November	61	6,210,053	3,850,908	3,075,023
December	59	5,732,125	3,411,074	3,825,949
1923				
January	62	5,838,310	3,951,885	3,748,651
February	60	6,771,958	4,039,202	3,001,697
March	57	7,740,945	4,875,414	3,828,315
April	55	8,394,184	4,259,558	3,535,635
May	57	9,292,223	4,317,537	3,414,115
June	54	8,924,326	3,590,011	3,581,060
July	52	7,527,281	2,666,354	3,942,247
August	53	6,950,578	2,577,922	4,304,034
September	55	6,457,455	3,254,575	3,683,574
October	55	6,898,425	3,855,244	3,595,737

SOLID TIRES				
1922	No. Mfrs. Report- ing	Inven- tory	Produc- tion	Ship- ments
January	11	181,769	40,224	33,294
February	11	183,448	39,492	36,805
March	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,089	63,408
July	11	176,375	71,505	60,425
August	11	189,698	84,313	69,435
September	11	200,016	82,767	66,797
October	11	213,942	85,480	71,275
November	11	234,584	85,775	61,466
December	10	244,061	77,221	64,570
1923				
January	11	262,462	83,343	60,611
February	11	270,191	75,457	63,394

March	11	265,843	79,788	77,144
April	10	260,631	71,468	72,609
May	10	268,323	77,288	67,147
June	10	283,435	72,445	52,126
July	10	263,891	42,345	45,219
August	10	262,810	48,141	45,925
September	10	249,379	37,074	45,971
October	10	234,945	37,285	48,065

"Production" and "Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipment" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Upholds Receivership of Hydro-United Tire

PHILADELPHIA, Dec. 3.—The appointment of receivers for the Hydro-United Tire Co., Pottstown, Pa., has been upheld by Federal Judge Dickinson here, who declared that the business dealings between the tire company and the National Iron Bank, Pottstown, "if not boldly admitted, would be incredible."

Officers and directors of the bank, Judge Dickinson said, had the tire company and its liquid assets "tied up in such a way that while it was free to refuse accommodation, it could block all efforts to get financial aid elsewhere."

Jacob G. Feist, a promoter, and one of the organizers of the tire company, sought to have John P. Hill and Ephraim Lederer ousted as receivers.

Judge Dickinson pointed out that on all loans to the tire company by the bank the tire concern had to keep a portion of the loan on deposit, all collections made had to be deposited in the bank and could be applied to any part of the company's indebtedness, and the tire company, he said, paid a 6 per cent bonus over the legal rate of 6 per cent interest for the loan, the bonus being paid to the bank's officers and directors for division among themselves and the members of a rubber syndicate for making the loan.

Transfer of Stock Means No Change in Star Rubber

AKRON, OHIO, Dec. 5.—Transfers of comparatively large blocks of Star Rubber Co. stock during the week are reported by brokers concerned in the deals to be without significance as far as any change in Star Rubber is concerned.

In some quarters the transfer of the stock was looked upon as a revival of the proposed merger between the Star Rubber and the Mohawk Rubber Co., which was generally discussed during the past summer.

ODELL RUBBER RECEIVERSHIP

SOUTH BEND, IND., Dec. 3.—George A. Crane has been appointed receiver for the Odell Rubber Co. of this city, who will continue the operation of the concern. Assets are placed at \$500,000, and liabilities, according to the receiver, do not amount to more than \$128,000.

Tire Output Mounts on Cautious Lines

Peak in January Will Be Below
Last Year—Balloon Future
Is Factor

AKRON, OHIO, Dec. 4.—The upward swing in production in the automobile tire industry continues, with every indication pointing to a peak being reached about the beginning of the new year. Every large factory and some of the smaller plants in the city continue to add to the payroll as rapidly as former employees can be located.

Production was advanced approximately 5,000 tires during November. It is generally believed that the present month will see much greater increases. Production in January, however, will not be as large in all probability as that of a year ago, when it amounted to 112,000 tires a day in the Akron district. This is due primarily to the fact that production during the early part of the present year was too large and left the industry at the beginning of the fall season with more than 6,000,000 finished tires on hand and with production still well under way.

Another reason for holding down the production ticket from previous high marks is the uncertainty which marks the tire industry for next year.

Outstanding in the fact, looking toward indefiniteness is the future of the balloon tire which, according to some authorities, promises to be greatly in demand next year, while it is believed in other quarters that the commercial development on a large scale of this new tire will require more than two years of effort.

Will Not Pile Up Inventories

However, should the popularity of this tire exceed the expectations of the more conservative leaders, an almost overnight change might leave the industry with a large number of other types of finished tires to be disposed of slowly.

Nor will the industry pile up a large inventory, if it can be helped, until some definite low price mark has been reached and it becomes certain that large write offs will not have to be taken on finished inventory.

Last year at this time the industry thought that the tire price bottom had been reached. The last year was the worst price cutting year in the history of the industry. This experience again added to what has become the proverbial caution with which producers are conducting their business and will militate against a top production figure for the coming winter.

ELECTRIC SERVICE MEETING

NEW YORK, Dec. 5.—The Automotive Electric Service Association will hold its fourth annual meeting at the Congress Hotel, Chicago, on Jan. 30 and 31.

Hawkins Considering Activities for Future

May Concentrate on His Ideas for Strengthening of Dealer Organizations

DETROIT, Dec. 5—Following his retirement as general consultant to the General Motors Corp., Norval A. Hawkins declares his intention of resuming his private business for the present, with a probable statement on his future activities in the automotive industry following the national shows. Hawkins has definite views on the future of the industry and will devote his efforts along the lines in which he is a specialist.

One plan which he has under consideration is to combine the sales activities of several manufacturers in different price classes with a view to developing a strong dealer organization to handle the products of the several manufacturers instead of scattering sales among three organizations. He has been approached on this plan by several makers and is giving it serious thought. There would be no financial connection among the factories, but only a merging of their sales and distributing forces.

Hawkins is opposed to the present sales system of maintaining associate dealers in large cities as making unfair competition and hindering dealer development. For several years he has been developing systems of specialized sales efforts for dealers in cities of varying sizes which, it is expected, he will put into effect in his new operations.

Announcement of Resignation

NEW YORK, Dec. 4—An announcement issued today by President Alfred P. Sloan, Jr., confirms the report in last week's issue of *Automotive Industries* that Norval A. Hawkins, general consultant, had resigned from General Motors Corp.

Commenting on the announcement, Vice-President C. S. Mott states that the resignation became effective Dec. 1 and that while Hawkins has not made known his future plans "it is not believed that he will retire long from active participation in the automotive industry."

Continuing, Mott says:

Nearly three years ago Mr. Sloan and I invited Mr. Hawkins to join the advisory staff of General Motors and to place at the service of the corporation his wide experience in marketing automotive products. Mr. Hawkins consented and was appointed director of sales-advertising and service on the advisory staff April 1, 1921.

It was thought at the time he was engaged that the special service we wanted from him could be completed in a year, but the magnitude of the various problems upon which he was consulted extended his work over nearly double the time anticipated, or until March, 1923.

In order that the corporation might continue to have the benefit of his counsel regarding business affairs in general, he was requested to continue with the corporation as general consultant to the executive com-

mittee. He now feels, however, that the important work for which he was engaged has been completed and hence has asked to be released Dec. 1.

Mr. Hawkins brought to General Motors an exceptional experience in the automotive industry. His advice was of great value in formulating the advertising, selling and service policies of the corporation as well as solving many other problems outside the scope of merchandising.

PERSONAL NOTES

Joy Treasurer of Packard

Richard P. Joy has been elected treasurer of the Packard Motor Car Co., succeeding F. R. Robinson, resigned. Robinson was secretary and treasurer of Packard for a number of years, his resignation being acted upon at the present directors' meeting. He is succeeded in the secretaryship by M. A. Cudlip, formerly assistant secretary. All other officers have been re-elected. Joy is president of the Detroit National Bank of Commerce.

E. Z. Jones Resigns

E. Z. Jones has resigned as sales manager of the Anderson Motor Co. of Rock Hill, S. C., effective Jan. 1. He was formerly identified with the Winther Motor Truck Co. and the Kissel Motor Car Co., and before becoming Anderson sales manager he was Anderson's Eastern sales manager, with headquarters in New York City.

Le Febvre Manages Traffic Section

W. C. Le Febvre has been appointed by Alfred H. Swayne, vice-president of General Motors and director of the Traffic Section of the Advisory Staff, as manager of that section, with headquarters in Detroit. Le Febvre has been connected with General Motors for a number of years, handling traffic matters in Detroit.

Unwin Succeeds Neville

B. V. Unwin has been appointed sales manager of Hinkley Motors, Inc., succeeding C. A. Neville who has resigned to become sales manager of Canavan Motors Corp., transportation engineers and truck and equipment distributors on the Pacific Coast. He also will act as resident manager for Hinkley in his new connection. Unwin has been with Hinkley for some time serving as assistant to Neville.

Exhibitors at Shows

NEW YORK, Dec. 5—Lists of exhibitors in the national shows announced today report sixty-five different makes of passenger cars and seven taxicabs—seventy-two in all—have been awarded space. Since the drawing in October there have been two withdrawals, the Princeton, made by Durant Motors, and the Monroe, manufactured by Monroe Motors, Inc., of Indianapolis. Durant announces that the Princeton will not be in production until after the shows.

Duplex Sells to Reo Factory in Lansing

Stockholders Approve Sale for \$200,000—Joseph Gerson Is New President

DETROIT, Dec. 5—By a vote of stockholders yesterday the plant and real estate in Lansing of the Duplex Truck Co. was ordered sold to the Reo Motor Car Co. for \$200,000. The Duplex company will move to its former plant at Charlotte and will resume operations.

The resignation of H. M. Lee as president and general manager of Duplex was accepted and Joseph Gerson was named to succeed him.

Directors in recommending the sale showed company notes of \$274,000 held by Detroit banks which they said must be paid or the company would go into receivership. A loss of \$150,000 on operations during the year had been incurred, attributed to overhead which might be eliminated or reduced with the reestablishment of the business in Charlotte. The space in present buildings was not required.

A financial statement as of Oct. 31 showed total current assets of \$520,024 of which about \$12,500 was in cash, \$210,000 in receivables and \$284,000 in inventories. Current liabilities were about \$304,000. Capital stock issued is \$987,250. Deficit as of September approximated \$190,000 with a loss in October of about \$11,000.

The sale of the Lansing property was opposed by smaller stockholders, who held that the offer was not adequate and that the business with proper management could be made to expand and require present space. Those favoring the sale regarded the transferral to Charlotte as advisable because of smaller operating costs and reduction in overhead. The service business of the company aggregated \$150,000 a year, it was pointed out.

The Reo Motor Car Co. will take over the property in part in January and in full in March. Just how the plant will be used in the expansion of Reo operations has not been determined. The purchase does not include machinery or equipment of any kind.

General Motors Employs More Than 100,000

NEW YORK, Dec. 5—The number of General Motors employees on Oct. 31 for the first time exceeded 100,000. This total does not include employees of Fisher Body and other affiliated companies, which, if added, would bring it to more than 135,000.

This total of 100,611 on Oct. 31 compares with 69,856 in October, 1922, and 49,125 in the same month in 1921. The monthly average in 1921 was 45,965 and 65,345 in 1922. The average for the first ten months of 1923 was 89,828.

Coolidge Touches on 4 Automotive Points

Annual Message to Congress Men- tions Muscle Shoals, Roads, Coal and Transportation

WASHINGTON, Dec. 6—Characterizing present business conditions as undergoing "an extraordinary revival," President Coolidge's annual message to Congress this week contains four major recommendations in so far as the automobile industry is concerned. They are:

(a) The sale of Muscle Shoals as soon as possible, subject to the right of the government to retake it in time of war;

(b) Extension of Federal aid in the construction of national highways;

(c) Congressional action for cheaper coal, without government ownership of mines, and

(d) A broader railroad policy, with a fair yield to the owners, and at the same time lower freight rates. On the last phase, he declared that consolidation appears to be the only feasible method.

No specific mention is made, or recommendation set forth in the message, that the Muscle Shoals project be sold to Henry Ford. That the President had the Detroit automobile manufacturer in mind as the prospective purchaser, however, is clearly shown by the fact that the message contains a recommendation that the property be sold and that in its sale Congress shall provide for a location for an auxiliary steam plant and rights-of-way.

Wants Committee Appointed

The appointment of a joint committee of the Senate and House was recommended to consider offers, conduct negotiations and report definite recommendations on the project's sale.

Touching on the question of coal, the President declared that prices have "become unbearably high." He urged the immediate action of both houses on the report of the Coal Commission which will be submitted soon. There should be no thought of Federal ownership, he declared. On the other hand, he asks Congress to vest the President with authority "to appoint a commission to deal with whatever emergency situation might arise, and to aid conciliation and voluntary arbitration and when collective bargaining fails to empower the President with the authority to control distribution in order to prevent profiteering."

A complete reorganization of the rate structure for freight is necessary, the President declared in discussing the railroads. This should be ordered at once by Congress, the message asserts. "Consolidation appears to be the only feasible method for the maintenance of an adequate system of transportation with an opportunity so to adjust freight rates as to meet such temporary conditions as now prevail in some agricultural sections," the President declared.

"The law for consolidations is not sufficiently effective to be expeditious. Ad-

ditional legislation is needed giving authority for voluntary consolidations, both regional and route, and providing government machinery to aid and stimulate such action, subject to the approval of the Interstate Commerce Commission."

On the matter of highways, the message declares that "everyone is anxious for good highways. I have made a liberal proposal in the Budget for the continuing payment to the States by the Federal government of its share for this necessary public improvement. No expenditure of public money contributes so much to the national wealth as that for building good roads."

President Coolidge Sees Ford

WASHINGTON, Dec. 3—The sale of Muscle Shoals to Henry Ford was the subject of a conference today between President Coolidge and Ford.

Ford called at the White House and held a twenty-minute conference with the President. The purpose of his call, it was stated, was to ascertain the administration's attitude and the disposition and status of Ford's offer for Muscle Shoals.

At the time of Ford's visit to the White House, the annual report of the War Department was transmitted to Congress by the President. It carries a recommendation that Congress provide \$7,000,000 to carry on work recommended by the Army Engineers' corps in connection with the completion of the dam at Muscle Shoals.

The Ford party, including E. G. Leibold, Ford's secretary; W. B. Mayo, engineer, and C. B. Longley, attorney, appeared before the Interstate Commerce Commission, following the White House conference, in regard to the consolidation hearings before the I. C. C.

Ford Railroad Opposed to Consolidation Idea

WASHINGTON, Dec. 4—Henry Ford's railroad, the Detroit, Toledo & Ironton, is opposed to any tentative merger in so far as it is concerned in the general plan for railroad consolidation, according to E. G. Leibold, vice-president of the road and Ford's secretary, testifying today before the Interstate Commerce Commission.

Leibold argued that the road had special characteristics such as financing and labor policies which Ford has installed in its operation.

The practice of shutting the road down entirely on Sunday was being followed, Leibold said. A profit-sharing plan by which employees may eventually acquire large portions of the stock has been installed, and the pay rates of employees have been increased to a point equal to those in any of Ford's enterprises and beyond the levels set by the Railroad Labor Board for the same occupations on other railroads.

In view of these conditions the witness asked the commission not to disturb the property in any proposed merger. Ford did not personally appear.

Overload, Not Truck Size, Damages Roads

Head of Federal Bureau Says Weight of Loads Should Be Well Distributed

WASHINGTON, Dec. 3—The Senate Committee, which is seeking to define the elements of a model traffic law for the District of Columbia, has been warned by Thomas H. MacDonald, chief of the United States Bureau of Public Roads that sound economy should be the test of motor vehicle laws; that over-restrictive measures should be avoided, and that overloading causes more harm to the highways than does anything else.

"Over-restrictive regulations should not be established and we ought to build roads that are strong enough to hold up under just as heavy loads as ought to be moved from the standpoint of economy, and no heavier," MacDonald told the committee.

Asked what weight limitations the Bureau of Public Roads recommended for motor trucks, MacDonald replied that there is no reason for limiting the maximum weight of trucks below 28,000 lb., save under seasonal conditions.

Continuing, he said:

But maximum weight is not so much the consideration; that is, that one requirement will neither make nor break the regulations nor assist the roads greatly. It is not a question of total weight that is moved. It is a question of how much weight is concentrated upon one wheel so far as its effect on the road structure is concerned. Given a plastic surface, it is a question of how much weight is concentrated per inch width of tire. So that if we regulate the wheel load to a maximum that is not too heavy for the road to bear structurally and then limit the pressure per inch width of tire, we have accomplished the purpose without necessarily fixing the maximum load to be moved at all.

MacDonald pointed out further that after all it is not so much the commercial size of the truck load which is causing trouble as it is a tendency on the part of the operator to overload. He further pointed out that speed and minimum tire thickness are important factors to be considered.

MacDonald believes that authority should be given to the commissioners of the District of Columbia to route heavy truck traffic over certain highways rather than to permit an indiscriminate use of all streets for this purpose when "economy of transportation" might not justify such usage.

GRAYSON F. LATHROP DEAD

SPRINGFIELD, OHIO, Dec. 3—Grayson F. Lathrop, assistant general sales manager of the Kelly-Springfield Motor Truck Co., died Saturday night at the city hospital from pernicious anemia. He had been ill since Nov. 10. Mr. Lathrop became identified with the Kelly-Springfield company in 1914 and was appointed assistant general sales manager two years ago. He was thirty years old.

NORMAL DECLINE EXPERIENCED IN EAST

New York

NEW YORK, Dec. 4—With a few exceptions car sales in the New York territory have settled down into the quiet that normally prevails before Christmas and the New York show. The exceptions are popular priced cars which have recently been redesigned. Dealers in several of these makes have completed the biggest November in their history, and sales are holding up quite well in the early part of December.

The average situation throughout the territory is just about this: Sales, particularly of closed cars, held up well until about Nov. 15. Since then activity has been slight, but it is not a case of complete stagnation, and the decline from summer and fall business has not been greater than in most years. Used car stocks of most dealers are not abnormal, and in some cases are lighter than they have been at this time of the year.

Several of the metropolitan distributors are making campaigns for Christmas deliveries. Several others are trying to organize their territorial dealers for more aggressive sales work throughout the winter than has usually been the case in the small city and country districts.

A partial analysis of the 1922 and 1923 registrations in the New York area showed that of the first fifty cars on the list about one-half had a unit sales gain over 1922 and the other half a loss. Some gains were as high as 100, 200 and 300 per cent.

Toledo

TOLEDO, Dec. 4—Demand for automobiles in the Toledo district is considerably better than it was Dec. 1, of last year. Movement is slack as compared with the summer months but activity in closed jobs has tided the dealers over a usually slow period.

Dealers have begun to store a few cars in anticipation of spring demand and to take care of the big output. Factory organizations have not begun as yet to push cars on dealers. Some dealers are expecting to absorb a large number of cars for storage after Jan. 1.

The used car situation is excellent. Sales in November were very good and improvement is shown in the percentage of deals for cash. Low priced jobs in the low priced class of cars were slow in moving but the better type of used car was moving very well.

Boston

BOSTON, Dec. 4—Automobile sales are proceeding at what the dealers state is a "fair average" compared with totals month by month for the year. November proved to be somewhat "wavy" in sales. It was slow at the start, then picked up, and again began to slack as Thanksgiving approached.

But while immediate sales are acting this way, some of the dealers report that the average for orders for spring delivery is increasing. Therefore, a number of dealers are stocking up now, feeling that the 1924 spring demand will be bigger than this year. And allotments are increased.

Used cars are not moving very rapidly, so the dealers are planning to get rid of their stocks as quickly as possible. Some dealers now have put all new cars off their floors and are holding special used car sales with the exchange cars on view.

About the best analysis of how the dealers began to worry a bit when the slowing up started in September is shown by the figures of registrations in the last few months as follows:

	July	Aug.	Sept.	Oct.
Cars	27,109	21,711	14,474	18,310
Trucks	2,807	2,762	1,928	2,961
Totals	29,916	24,473	16,402	21,271

November is expected to show a falling off because people wait until after the New Year to register, when it is so late in the season. And many others will drive their old cars or store them this winter because of the hard storms of last winter, when snow that fell Thanksgiving was on the ground after the March show.

Detroit

DETROIT, Dec. 5—New cars delivered by Detroit dealers in November totaled 3136, a gain of more than 50 per cent over November of last year, when the total was 2099. Of this year's total, closed cars were 2119 and open 1017.

In November, last year, closed and open car properties were sixty to forty, respectively.

Regarding possible December business dealers are certain that it will exceed last year, although December surpassed November in 1922. The trend throughout the year has shown each month gaining over last year, and they are certain this month will be no exception.

Used cars have been moving in large numbers since dealers have instituted weekly payment plans with deliveries on first down payments. This in some instances is as low as \$5. Sales of new cars also have been greatly stimulated by the plan of making delivery on first down payments.

Conditions throughout the State distributing territory also are declared to be much better, this being helped by continued open weather. One distributor reported a gain of 800 per cent over his former November business. There are now several Appleby plan used car markets operating in the State. These are expected to relieve used car conditions in their cities, but aside from these, used cars are moving better, due to application of low delivery costs.

Los Angeles

LOS ANGELES, Dec. 4—Detailed figures on the retail automobile situation here for November are not available but they will show a slight reduction in the sale of new cars over October, but an increase over November last year. The month was normal in every way and whatever falling off in sales there was can be attributed chiefly to the inability of dealers to make deliveries. The closed car demand exceeds the supply. Some dealers report being sixty days behind in closed car deliveries.

The recent show had a decidedly stimulating effect on business, the number of high priced cars disposed of being remarkably high. Rural communities are showing a slackened demand for all but the most popular low priced cars.

Money with which to purchase automobiles seems plentiful, the banks and funding companies continuing liberal in their loans. Truck sales also continue very good, the demand coming chiefly from business houses. As the result of legislation establishing reduced weight limits there is a slight falling off in the demand for heavy duty models. The tendency toward pneumatic equipment on trucks of the 2-ton class is growing rapidly.

Factory representatives of new makes of passenger cars who have been here recently report difficulty in obtaining representation except in the low priced class.

Indianapolis

INDIANAPOLIS, Dec. 4—With sales easing off toward the mid-winter, there are some dealers in this city who sold more new and used cars in November, than they did in October. The volume of all sales, however, was down considerably and a greater falling off is expected in December.

Distributors generally are more willing to talk of "dealers signing up for more cars next year" than they are about present sales in the rural regions. At that, both local and State sales are ahead of last year.

One noticeable tendency during November was the desire of buyers to pay less cash and to use financing agencies to a greater extent.

The used car situation is better than it was a month ago, as far as inventories go. A considerable number of dealers have made interesting gains in sales in this line during the last ten days, in spite of a more or less "dead" used market existing during the early part of the month.

On the whole there has been little stocking of cars except with those branches or agencies that are always known to stock at this season. There are lines which cannot yet supply sufficient closed jobs of certain types to meet the local or State demand.

COUNTRY TRADE BETTER THAN YEAR AGO

Milwaukee

MILWAUKEE, WIS., Dec. 4—Retail selling in November developed a great many spots in this territory, and business was much more uneven than in October, with a consequent decline in the total sales volume. This, however, ranges from 40 to 75 per cent over November, 1922. Even those dealers whose volume figured near the inside of this range declare business more active than a year ago, and they feel that December will not show the same heavy recession in sales that ordinarily comes at this period.

Stocks in the hands of dealers Dec. 1 on the average were the smallest ever known, for the movement of new cars into first hands all through November exceeded any past record. Closed cars are still very scarce, and some dealers are behind on orders, although the majority are now able to place cars into customers' hands upon purchase.

Country dealers report to Milwaukee distributors that their trade is well maintained at an appreciably higher level than ever before so late in the year. Trade is by no means confined to the lowest price classifications. In many cases farmers are buying closed cars of the medium-price level. While some are offering Fords in part payment, the majority are retaining their old cars for "chores" rather than ordinary passenger transportation, for which the new cars are being purchased.

With dealers offering used cars at prices placing them within the reach of the smallest purse, the movement of stocks has been accentuated in rapidity, but used cars still are decidedly a drug on the market.

Chicago

CHICAGO, Dec. 4—As compared with other months of this year automobile sales in Chicago are at a low point, but the trade is considerably ahead of what it was at this time last year. The demand for closed cars continues good and dealers who are able to fill all orders are well satisfied with the volume of business. Many owners of comparatively new open cars are trading them in on closed models, thus further complicating the used car situation.

Used cars are accumulating at a starting rate and some dealers are hard put to it to find storage space for stocks on hand. Prices are low but sales of used cars remain slow. Dealers are offering many inducements to used car buyers, such as 100 gallons of gasoline free, very small down payments, discounts off quoted price lists and additional equipment. Some of the large dealers are prepared to take heavy losses on their used car stocks.

The trade in general is optimistic as to the future, although some dealers de-

TEXAS FARMER ENTERS LIST OF CAR BUYERS

DALLAS, TEX., Dec. 4—The situation in Texas is unique. There never has been as much money in circulation. The farmers made 4,000,000 bales of cotton this year and they sold them at good prices. They have wanted automobiles for years and they are buying them now.

They are paying cash at present and their financial condition or rating will be such when the new year opens that automobile dealers will not hesitate to sell for part cash and good notes which the banks will handle. It looks like good business in the agricultural belts another year—something the dealers have not had for years.

clare the used car will continue to be a disturbing element. Traffic congestion in and around Chicago also has reached the point where it is a serious sales resistant and so far very little has been done to correct it.

There is some stocking of open cars for the spring business, but this is not heavy and is not at all in proportion to the demand that is expected in the spring.

Kansas City

KANSAS CITY, MO., Dec. 4—The general tone of business is far better with the opening of December than at any time this year. The most optimistic note comes in reference to the condition of farmers and their disposition to buy. The hesitancy of farmers during the earlier months of this year is well known; and the widespread idea that farmers are not in the market seems to have required a great deal of combating, both in the minds of sellers and in the minds of the farmers themselves.

There is a distinct tendency to stock cars and an even more pronounced tendency toward storage by the manufacturer. Not so very much storage has taken place yet, and there has been comparatively little actual pushing of cars into dealers' hands, but the signs of this movement are appearing.

Local distributors and dealers until lately have been inclined to resist the hope of manufacturers that Kansas City territory would produce a big volume next spring. But the temper is changing; and it can be said, at least, that here the expectation of a big trade next spring, and, indeed, of a good volume for the season this winter, is increasing.

Used cars are still a bugbear in some places.

Salt Lake City

SALT LAKE CITY, Dec. 4—Dealers report a substantial falling off in sales in the last five or six weeks. The weather had been open all season until last week, when a few inches of snow fell. Dealers in small cars are doing well as a rule.

This city has a certified used car public market now, but it is too early to predict what this will do for the dealers. The used car market is described as in a bad condition.

There is one thing on which all of the representative dealers of the city are agreed: That is, that the outlook for the future is satisfactory. The farmers are in better shape than they have been for some time, and at least one company reports noting a tendency, not marked as yet, to pay cash for new cars.

Philadelphia

PHILADELPHIA, Dec. 4—The present retail situation presents virtually the same characteristics as in October, namely, few cars in storage warehouses and clean stocks generally; deliveries obtained within a reasonable time and no signs of a quick recession in business.

This difference, however, is noted; some factories are urging dealers to take more stock, evidently in preparation for suddenly increased demand after the automobile shows. This particular phase, however, is not general, and not a few distributors assert that their factories are in no way importuning them to take cars at this time.

Retail business, as a whole, is normal for this time of year, and the volume of trade is but slightly lower than that in October and somewhat in advance of that on Dec. 1, 1922.

The used car situation is said to be unsatisfactory. Despite the heaviest display advertising recently done by important houses handling high grade cars, results in cleaning out traded-in cars have been most disappointing.

NEW ROADS IN ARGENTINE

WASHINGTON, Dec. 4—Impetus to the automobile industry in the Argentine, which will be of interest to the American exporter, has been given by virtue of a law just passed in that country authorizing the construction of 6214 miles of new highway in the province of Buenos Aires.

LITTLE DAMAGE TO BODIES

INDIANAPOLIS, Dec. 4—Chester S. Ricker, general manager of the Duesenberg Automobile & Motors Co., announces that a thorough inspection of all the Duesenberg automobile bodies which were involved in the fire last week in a local storage warehouse reveals but trivial damage to this stock.

FINANCIAL NOTES

Stromberg Carburetor Co. of America, Inc. has declared a quarterly dividend of \$2 and an extra dividend of \$1.50, payable Jan. 2 to stock of record Dec. 11. The last quarterly payment was \$1.75. The quarter showed net profit of \$189,761 or \$2.53 a share, as compared with \$156,121, or \$2.08 a share in the third quarter of 1922. For the nine months the company shows a net profit of \$810,731, after expenses and taxes, equivalent to \$10.80 a share earned on the outstanding 75,000 shares of no par capital stock. This compares with \$378,716 or \$5.05 a share in the same period in 1922.

Hayes Wheel Co. announces gross sales for November of \$1,661,000, compared with \$1,194,000 for the same month last year. For the eleven months of the year, sales have been \$17,232,000 compared with \$12,968,000 for the same period in 1922.

Pierce-Arrow Finance Corp. reports that the company, which began operation in September, 1923, had purchased \$654,005 in paper up to Oct. 31. The entire capital stock of the finance corporation is owned by the Pierce-Arrow Motor Car Co.

Jordan Motor Car Co. has declared a special dividend of \$5 per share on the common, payable Dec. 31 to stockholders of record Dec. 15. It also has declared the regular dividend of 1% per cent on the preferred.

Bower Roller Bearing Co. has declared a dividend of 5 per cent, payable Dec. 12 to stock of record Dec. 1. The last dividend paid was 5 per cent cash and 33 1/2 per cent stock Dec. 28, 1922.

Yellow Cab Manufacturing Co. has declared a 100 per cent stock dividend and also declared monthly dividends of 33 1/2 cents a share for January, February and March.

Hood Rubber Co. has declared the regular quarterly dividend of \$1 a share on common, payable Dec. 31. Books close Dec. 20 and reopen Jan. 2.

Packard Motor Car Co. has declared the regular quarterly dividend of 3 per cent on the common, payable Jan. 31 to stock of record Jan. 15.

Electric Auto-Lite Co. has declared the regular quarterly dividend of \$1 a share, payable Jan. 2 to holders of record Dec. 15.

C. M. Hall Lamp Co. has declared a dividend of 5 per cent payable Dec. 12 to stock of record Jan. 15.

Dealers Taking Cars for Spring Demand

(Continued from page 1172)

are being made. The new plant gives a capacity for 500 Jewetts and 200 Paiges daily. Maxwell-Chalmers is continuing at approximately 200 daily and will increase this output as the month progresses.

Hupp will build about 3000 cars in December and will open January on a 200 daily basis. Oakland and Olds are continuing at about 200 daily each. Reo will build approximately 150 cars and speedwagons daily. Rickenbacker continues at about fifty daily and is planning to double this as factory changes are completed. Dort is building about sixty daily.

Columbia and Liberty are approximating thirty daily. Cadillac and Packard continue to operate at capacity approximating 100 a day.

Packard has increased its output on the single eight to about 600 monthly, and the single six ratio is three times this. Wills Ste. Claire is completing its manufacturing plans under the reorganization and is about ready to get into large production. Lincoln continues at about thirty-five daily, which will be increased when the plant equipment is completed.

Plants Follow November in Production Schedules

(Continued from page 1172)

the falling off of other years. During this month many of them will take inventory in preparation for an active season when car producers swing back into the old pace.

Truck operations show little change, and none is expected for the present. The same conservative course that has been followed for the last several months is being pursued. Manufacturers have governed output only by actual demand and have accumulated little if any reserve stocks. Bus operators are taking a good percentage of the output as this medium of transportation extends in favor.

Association Organized by Cylinder Regrinders

CHICAGO, Dec. 5.—Organization of a National Cylinder Regrinders Association was completed at a meeting here of representatives of a number of local and sectional associations. The name adopted was "National Cylinder Regrinders and Motor Builders Association."

Officers were elected as follows: President, J. J. Fuchs, Jr., Omaha; Vice-president, J. B. Cook, Memphis; secretary, Charles H. Hart, Chicago and treasurer Dwight W. Grover, Newark, N. J. Additional directors are T. A. Myer, Indianapolis and J. E. Percival, St. Louis.

The principal objects set forth in the constitution adopted are "To promote general welfare and progress of the cylinder regrinding and motor rebuilding industry of North America and to work more closely together in earnest and active cooperation so that the cylinder regrinding and motor rebuilding business shall continue to expand and take its rightful place in the industry."

Publication of an official organ called the "Regrinder" has been started under the editorial direction of W. McWain.

FORD ENGINE OUTPUT

DETROIT, Dec. 5.—Engine No. 9,000,000 is scheduled to leave the production line at the Ford Motor Co.'s Highland Park plant before the end of the year. Total production for the year will be more than 1,975,000.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

General business conditions continue good, although the day-to-day developments are still irregular. The stimulus imparted by holiday buying is becoming more evident, and a record-breaking season is predicted.

The outstanding development in basic commodity markets last week was the sharp recovery in prices of pig-iron, which have been declining steadily for several months. The *Iron Age* composite price of pig-iron stood at \$21.86 on Nov. 27, recording a gain for the week of more than 5 per cent. Cash cotton attained a new high record for the year on Wednesday at 37.60 cents a pound.

Car loadings for the week ended Nov. 1 numbered 991,745, or 44,322 less than for the preceding week. With the exception of holiday weeks, this is the first time since last May that loadings have not exceeded a million a week. Net operating incomes of Class I railroads in October amounted to \$92,238,384, representing an annual return of 4.46 per cent on their tentative valuation. The corresponding figure for October last year was 4.05 per cent.

Production of crude petroleum in the week ended Nov. 24 average 2,198,250 barrels a day, marking the fourth successive decline, and the smallest daily average which has been recorded since the week of Oct. 13.

The Fisher index of wholesale commodity prices and Bradstreet's food index were both unchanged last week, the former at 151, the lowest of the year to date and the latter at \$3.37, comparing with \$3.50 for the corresponding week last year.

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Nov. 28 amounted to \$9,329,116,000, or about 15 per cent less than the total for the preceding week, but 3 per cent more than for the corresponding week last year.

Discounts by Federal Reserve banks increased \$48,200,000 during the week ended Nov. 28, \$41,000,000 of the gain being in bills secured by Government obligations. Holdings of United States securities increased \$11,100,000, and Government deposits \$8,700,000, while members' reserve deposits declined \$10,000,000. An increase of \$23,200,000 in the circulation of Federal Reserve notes and a decline of \$15,600,000 in reserves combined to reduce the reserve ratio from 77.1 to 76.4 per cent.

Loans of reporting member banks declined \$31,000,000 during the week ended Nov. 21. Loans secured by stocks and bonds increased \$47,000,000, while loans secured by Government obligations declined \$15,000,000 and "all other" loans \$63,000,000. There was a decrease of \$36,000,000 in holdings of Government securities and an increase of \$22,000,000 in other securities. Net demand deposits declined \$118,000,000.

Race Championship Captured by Hearne

By Finishing Second in Los Angeles Event He Displaces Jimmy Murphy

LOS ANGELES, Dec. 3—Finishing second in the 250-mile race on the Los Angeles speedway on Thanksgiving Day, with his greatest rival Jimmy Murphy, in third place and with Bennett Hill the winner, was sufficient to give the American Automobile Association championship title to the veteran Eddie Hearne, who displaces Murphy, winner of the title in 1922.

Decision of the championship went to the final race of the season, with Hearne in a safe lead, provided he could finish in the money and Murphy did not win. Hill turned up the winner and Hearne landed second, so the final count of points for the season gives him the driving honors with 1882 points to Murphy's 1350. The unofficial standing of the championship field is as follows:

Hearne	1882
Murphy	1350
Hill	955
Hartz	820
Milton	810
Fengler	720
Wonderlich	368
Cooper	310
Elliott	266
Lewis	234

Of the eight championship events of the season Hearne, driving a Durant Special won twice at Kansas City in July and Altoona in September. Murphy also driving a Durant Special, won at Los Angeles on Washington's Birthday and at Fresno in April. Milton won the 500-mile race at Indianapolis in an H. C. S. Special; Hartz in a Durant Special, won at Fresno in September; Fengler in a Wade Special, captured the Kansas City race in October, while the windup of the season, the Thanksgiving Day race at Los Angeles, fell to Hill, pilot of a Miller.

Sixteen cars started and eleven were running at the finish of the race. Hill's time was 2 hours 13 minutes 25 seconds. In addition to those named the drivers who finished were Fengler, Elliott, Shafer, DePalma, Boyer, Durant, Duray and Crawford. Cooper's H. C. S. Special went out with broken valves. Milton was eliminated by a broken steering knuckle that almost brought disaster. Shafer's car became unmanageable when he applied the brakes too severely and plowed into the pits, injuring three spectators. The fatal accident of the day resulted in the death of George S. Wade of Kansas City, owner of the Wade Special driven by Fengler, and Russell Hughes, a photographer.

The cars were drawn up in two flights for the start with Harry Hartz, in a Durant Special, in the first row. The first group got under way but Boyer's

car burst into flames and the second group stopped. The others in the first flight did not continue but Hartz who afterward claimed he had been told by the starter to make an inspection lap, went ahead at part speed. Not knowing Hartz was making his lap Hughes rushed over to Boyer's car to take a photograph and Wade who had owner's privileges joined the group of drivers and mechanics who were extinguishing the flames.

Jimmie Lee of Indianapolis, mechanic for the Duesenberg team, and others also were in the path of Hartz's car as he came into the stretch. Hartz saw the cars ahead of him and undertook to pass. Wade and Hughes had no chance to escape. Lee was pinned against the rail and his legs crushed.

INDUSTRIAL NOTES

Steel Products Corp. of Sheboygan, Wis., which has been organized with \$100,000 capital stock, takes over the bumper and automotive equipment business developed by the Jenkins Machine Co. of the same city, which finds itself unable to meet demands without encroaching upon its extensive business in woodworking machinery, tools, etc., in consequence of which it is disposing of the automotive department. The new owners are Fred Zschetzsch, A. G. Studeman and W. B. Collins, all of Sheboygan. The Jenkins company has been distributing its output of bumpers exclusively through the Zundel Co., and this arrangement will be kept in effect for the present. The new corporation formally started operations Dec. 1.

R. F. Townsend, who some time ago bought the patents, fixtures and some machinery of the defunct Townsend Manufacturing Co. of Janesville, Wis., from the receiver, and leased the buildings occupied by that company in order to resume the manufacture of the Townsend tractor and engines, has incorporated his new business as the Townsend Co. of Janesville. The initial capital is \$50,000 preferred and 100 shares of no-par common stock. In addition to Townsend the incorporators are Thomas S. Nolan, W. H. Dougherty and Paul N. Grubb.

Chevrolet Motors Co.'s Janesville division is making four additions to its works, the most important being a so called Baus deck house costing \$15,000, for pre-shipment storage. Production schedules for December represent an increase over November, with a heavy increase planned Jan. 1 and another Feb. 1.

Wausau Parts Manufacturing Co. recently incorporated at Wausau, Wis., to manufacture automotive equipment and parts, has changed the name to Wausau Motor Parts Co., so that it may express the nature of its business better. It is now getting into production on a number of lines.

100,000 NEW FORD OWNERS

BOSTON, Dec. 5—A prominent bank man stated today that in talking with a group of financial men in Massachusetts who compared notes on the subject, he discovered that more than 100,000 people in the Bay State had availed themselves of the Ford weekly payment plan and would be owners of cars next year.

METAL MARKETS

At this time of the year the steel market's mood always turns more or less reminiscent, and the present is no exception. Thoughts go back fondly to the last month of last year when a gratifying buying movement began to make itself felt—following a period of dullness much on the order of that of the last few months. To railway equipment, buying of steel was then given the credit for starting the ball rolling, and it is this class of buying that just now is frequently mentioned as suddenly quickening to the point where its momentum would induce a broader demand generally.

For some time railroads are reported to have been sounding freight car builders with a view to placing contracts provided price would be made sufficient of an inducement. Such orders, of course, would be followed in turn by the placing of orders for the necessary steel. Thus far, however, the demand for steel from freight car builders has been anything but spectacular. Railroads, more so than any other class of steel consumers, can choose their own time for entering the market. Frequently their orders have come in the steel market's greatest hour of need. This may be nothing more than a coincidence.

The tone of the market is susceptible to considerable improvement without values undergoing very much of a change. Considering the sharp recession in the steel mills' back-log of orders, which at this time is the sole reason for their curtailed operations and output, maintenance of present prices must be ascribed to the anticipation of a sufficient volume of business to act as a prop for them. The interval between the prevailing quiet and the resumption of buying is being bridged over by producers being prepared for a still more marked tapering off in orders during December. If a buying movement should materialize, they will be agreeably disappointed. If it does not, they will postpone worrying until after the holiday period, about what sort of a tonic will quickest restore buying appetite.

Pig Iron.—Not very much business was done at the somewhat higher prices which followed wholesale liquidation of real bargain lots. Automotive foundries now are reported to be fairly well covered for their first quarter 1924 requirements.

Aluminum.—Importers are reported to have been put on disappointingly short rations as far as allotments for the American market are concerned. With the limited quantities in sight from Europe, importers' first concern naturally is to obtain for these a price as close to that of the domestic producer as possible. Imported aluminum, therefore, can no longer be looked upon as competing with the domestic product, but merely affords to European producers an opportunity to clean up on the limited tonnage they allot to the United States as much profit as if they waged a real price war on the American producer, and brought in enough metal to make their influence felt. Obviously curtailment of allotments for the American market by European producers is not so much due to impaired production in Europe or extraordinary demand from countries other than the United States, as to an astute sales policy.

Copper.—Continues to be the only cheap non-ferrous metal. Lake Superior producers talk of the necessity of a protective duty to shut out cheap South American metal. The latter, however, is mined by American corporations.

Calendar

SHOWS

- Jan. 5-12 New York, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Eighth Coast Artillery Armory.
- Jan. 26-Feb. 2—Chicago, Annual Automobile Show, under the auspices of the National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.
- Jan. 26-Feb. 2—Chicago, Annual Automobile Salon, Hotel Drake.
- Feb. 4-9—Chicago, Tenth Annual National Motorcycle, Bicycle and Accessory Show, Broadway Armory, under the auspices of the Motorcycle and Allied Trades Association, A. B. Coffman, secretary.

FOREIGN SHOWS

- Aug. 23-Sept. 6—Toronto, Ont., National Automobile Show in conjunction with the Canadian National Exhibition under the sanction of the Canadian Automotive Equipment Association and the Automotive Industries of Canada.
- Dec. 8-19—Brussels, Passenger Cars, Trucks, Airplanes and Motor Boats, Aviation Palace.
- April 2-13—Barcelona, Automobile Exposition, under the auspices of the Confederacion de Camaras Sindicales Espanolas del Automovillismo y Cielismo, Palacio de Arte Moderno.
- RACES**
- Aug. 5 or 6—Lyons, France, European Grand Prix.

CONVENTIONS

- Dec. 11-13—St. Louis, Convention of American Petroleum Institute, Hotel Statler.
- Jan. 5—New York City, Annual Meeting, Automotive Electric Association.
- Jan. 14-18—Chicago, Annual Convention and Show of the American Road Builders' Association, the former to be held in the Congress and the latter in the Coliseum.
- Jan. 30-31—Chicago, Fourth Annual Meeting of the Automotive Electric Service Association, Congress Hotel.
- May, 1924—Detroit, International Motor Transport Congress under the auspices of the National

Automobile Chamber of Commerce.

- June, 1924—Washington, Pan American Highway Congress, under the auspices of the Pan American Highway Mission.

S. A. E. MEETINGS

- Dec. 13—Metropolitan Section, Vehicles for Package Delivery.
- Jan. 22-25—Annual Meeting of the S. A. E.—Detroit.
- Feb. 14—Metropolitan Section, Vehicle Depreciation.
- March 13—Metropolitan Section, Replacement Parts and Accessories.
- April 17—Metropolitan Section, Fleet Maintenance, F. W. Winchester.
- May 15—Metropolitan Section, What Roads and Steels Do to Automobiles.

European Road Race to Be Run at Lyons

PARIS, Nov. 23.—Lyons was selected today as the scene of the 1924 European Grand Prix road race for 122 cu. in. cars, the date for which has been set for Aug. 5 or 6. The course selected is a part of the one used in 1914 for the French Grand Prix held only a few weeks before the declaration of war, and in which the Mercedes came home first, second and third.

The set of roads constitute a triangle measuring about fourteen miles round, the first leg being fairly straight and fast, the base of the triangle being hilly and winding, and the third leg constituting a perfect switchback road terminating in a winding descent to a hairpin turn constituting the apex of the triangle.

The grandstands will be erected at the same place as in 1914, near the hairpin, and will give a perfect view of the cars as they come down the winding hill from the fast leg of the course and will allow spectators to follow the cars for a distance of nearly two miles.

French Touring Grand Prix

In addition to the 122 cu. in. race, this course will be used for the French Touring Grand Prix, limited to three classes of touring cars running on a limited allowance of gasoline and required to maintain an official minimum average for eight hours, half of this being at night, and afterward to run 300 miles at speed.

The leading long distance motor cycle race of the year will be held over the same course. It is probable that these two events will precede immediately the 122-in. 500-mile race.

While prospective entrants are not giving out any information regarding their plans, it is known that almost all will make use of supercharger engines. There is a possibility of two-stroke superchargers coming to the starting line; engineers who have experimented in this direction claiming that as regards gasoline consumption they can get 150 hp. out of a 122-in. engine.

The firms expected to take part in the European Grand Prix are Fiat with four cars, having Felice Nazzaro, Bordino and Salamano as three of the drivers; Delage with René Thomas, Robert Benoist and Albert Divo; Bugatti with three or four; Voisin with three; and Sunbeam with a trio to be handled by Dario Resta, Guinness and Segrave.

Marmon to Hold Dealer Meeting on Anniversary

INDIANAPOLIS, Dec. 1—Nordyke & Marmon Co. will hold a dealers' and distributors' convention at its factory here Dec. 10, 11 and 12, when sales problems for 1924 will be the principal topic of discussion. The visitors will be taken to the Indianapolis Motor Speedway incident to the convention for a test of Marmon four-wheel brakes.

The convention sessions will be presided over by H. H. Brooks, sales manager. Walter C. Marmon, president of the company, will make the address of welcome and will give a talk on the general business outlook.

The company was established under the same firm name it now bears seventy-two years ago and has been manufacturing automobiles for twenty-one years.

Acquisition of Zeppelin Reaffirmed by Goodyear

AKRON, OHIO, Dec. 4—Goodyear Tire & Rubber Co. has reaffirmed its previous announcement that Akron will be the seat of the Zeppelin industry following the purchase of the Zeppelin company's patents and rights.

The announcement was made when German cable reports indicated that the German company was making preparations to continue to produce this class of airship.

Announcements have not been made as yet regarding details of the proposed "Goodyear-Zeppelin Co." which will be the actual ship building company. Goodyear purchased Zeppelin rights several weeks ago.

31 Michigan Haulers in New Association

DETROIT, Dec. 3—Michigan Commercial Haulers, Inc., was formed as an outgrowth of the Michigan Highway Transportation Association at the convention of the latter body in Grand Rapids, when it was determined that the interests of the freight haulers demanded special organization. Affiliated in the new association are thirty-one commercial haulers, formerly members of the highway association. Its officers are:

Frank C. Schmidt, Detroit, president; E. M. Radcliffe, Grand Rapids, first vice-president; F. H. Stevens, Jr., Saginaw, second vice-president; H. V. Wood, Grand Rapids, secretary, and H. G. Beebe, Jackson, treasurer.

The executive committee consists of E. F. Moreton, Detroit, who retires as president of the highway association; G. Vanloo, Muskegon; L. G. Wilson, Detroit; E. C. Andrews, Adrian; Charles Bentley, Allegan; D. L. Darling, Fremont; H. H. Hardy, Lansing; Edward Razeman, Kalamazoo; H. H. Stevens, Flint, and J. H. Flannigan, Marquette.

The Michigan Highway Transportation Association is now composed entirely of bus operators, and will retain its present name but will function solely in the interest of the passenger-carrying business. It has about forty members. Its new officers are:

George P. McCallum, president; Ray Wolfe, Coldwater, vice-president; H. H. Hardy, Lansing, secretary, and W. E. Taylor, Owosso, treasurer.

PLAN NEW TRANSMISSION

LOS ANGELES, Dec. 3—Announcement has been made of plans to inaugurate a transmission manufacturing business here that will culminate in a \$5,000,000 enterprise. The device is said to have been invented by C. E. Starr. Among those named as officials and financiers for the undertaking are R. C. Durant, automobile manufacturer; Harry Miller, automotive expert; C. M. Stevens and Edgar Starr.